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UNIVERSITY OF CALIFORNIA SAN DIEGO

The Making of Racialized Diabetes in Postcolonial Singapore

A Dissertation submitted in partial satisfaction of the requirements
for the degree Doctor of Philosophy

in

Sociology (Science Studies)

by

Mohammad Khamsya Bin Khidzer

Committee in charge:

Professor John Evans, Co-Chair
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Professor Hallam Stevens
Professor Saiba Varma

2024

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University of California San Diego

2024

DEDICATION

For my beloved Siti, who stood with me through this wonderful journey, and my ray of sunshine, Emir.

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Chapter 5, in part, is a reprint of the material as it appears in the journal *Science, Technology and Human Values*, Bin Khidzer, Mohammad, Sage Publications, 2023. The dissertation author was the primary investigator and sole author of this paper.

Chapter 3, in part, has been submitted for publication of the material as it may appear in the journal *East Asian Science, Technology and Society*, Bin Khidzer, Mohammad, Taylor and Francis Online, 2024. The dissertation author was the primary researcher and sole author of this paper.

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ABSTRACT OF THE DISSERTATION

The Making of Racialized Diabetes in Postcolonial Singapore

by

Mohammad Khamsya Bin Khidzer

Doctor of Philosophy in Sociology (Science Studies)

University of California San Diego, 2024

Professor John Evans, Co-Chair

Professor Daniel Navon, Co-Chair

This dissertation research examines the historical formation of racialized diabetes in Singapore between 1900 – 2020. The specific period was chosen to capture how the association between race and disease was constructed at different junctures of Singapore's history – the late colonial period between 1900 to 1965, the postcolonial developmental years between 1965-2000, and finally the contemporary biomedical age

beginning in 2000 to 2020. My study illuminates how racialization and the emergent meanings change as they interface with social, political, economic, and technoscientific transformations. I utilize a combination of archival research and data from fieldwork to analyze the way that diabetes intersects with race, ethnicity and the nation. Building on the recent resurgence of postcolonial Sociology, I attend to the question of how societies deal with the legacy of colonial racial knowledge in science and medicine.

My research shows that colonial constructions of diabetes were informed by anthropological constructs relating to biological race and notions of civilization. These ideas become intensified in the postcolonial period (1965-1990), as Singapore's political elite engaged with cold war developmentalism and global health narratives to buttress claims of national progress; the increasing prevalence of chronic diseases such as diabetes indicated that Singapore had successfully broken out of the epidemiological profile typical of less developed nations, thereby legitimizing anti-democratic development policies. The convergence between developmentalism and diabetes also produced a framing of disease that drew from eugenics and colonial racism, where the higher prevalence of diabetes among the South Asian Indians in Singapore for instance, was explained to be a consequence of genetic constitution that is ill suited for development.

The late 90s saw a shift in the management of life and population as Singapore continued to grapple with the rise of chronic diseases and how it impacts the long-term health of the nation. By health of the nation, I mean the political economic consideration of healthcare financing as well as the maintenance of productive citizen subjects, especially as the discourse of human capital begins to take root. I argue that these

conditions capture the formation of a more expansive biopolitics, where mundane, but no less potent governmental technologies such as healthcare financing instruments were utilized to manage sickly and risky bodies through enlisting subjects as ‘partners in health’. The emergent biopolitics constitutes greater research emphasis on the management as opposed to prevention of diabetes, large-scale epidemiological surveys that enable articulations of risky bodies and disease burden, and lastly the creation of racialized risk and responsibility in diabetes under new modes of healthcare financing.

The contemporary biomedical era, in which precision medicine became central to Singapore’s healthcare plans and bioeconomic aspirations, captured a new modality of racialization. The Chinese, Malay and Indian populations in Singapore were projected as biologically distinct, and as being a microcosm of Asia. Hypothetically, this allowed for the scaling of policy measures, treatment and therapeutics to the larger region and in Asian diasporas. This era also heralded a new global and transnational research program that reinforced the uniqueness of ‘Asian diabetes’ while obscuring social determinants of health. Lastly, I highlight the distortions in the Singapore as Asia narrative by demonstrating how it tended to focus on the Chinese population while excluding the Malay and Indian racial groups, a pattern which reflects Singapore’s long standing geopolitical stance in the Asian region.

In the final chapter, I take a leaf out of Annemarie Mol’s page and ‘multiply’ diabetes, homing in on how people do diabetes at the everyday practices while situating them within the broader discourse of racialized diabetes in Singapore. I discuss three distinct cases based on a combination of in-depth interviews and observations, highlighting the different ways of doing diabetes that center around daily routines,

management of the body, dealing with shame, and finally the weaving of religious beliefs and practices into diabetes. The inclusion of these cases is meant as a preview for a future ethnography of racialized diabetes I aim to carry out as part of my book project.

Chapter 1: Introduction

It is becoming generally acknowledged that Asian diabetics frequently show amazing returns to normal blood sugar curves after a short period of tolbutamide or insulin treatment. I feel that it is worthy to note that it now appears that Europeans living in the tropics also seem to have this power of recovery from diabetes mellitus. If, therefore, this temporary diabetes with, as in this case, no obvious cause really does not occur in temperate climates, then it infers that the tropical environment either causes a temporary form of diabetes or alternatively enables recovery from classical diabetes to take place. (Waddell 1959, 1120)

Chinese people who are overweight, for instance, have a dramatically higher chance of developing diabetes and heart disease than Malays and Indians. Indians and Malays, though at higher risk of diabetes and heart disease, possibly for genetic reasons, appear better able to resist the detrimental effects of weight gain. Being Asian alone is considered a risk factor for diabetes. (Chang 10 Dec. 2011)

The two quotes represent discussions of diabetes that occurred at markedly different points in history. The first quote, which describes treatment efficacy for a European diabetes patient, was made by a Singapore based physician named W.B. Waddell. At the time when Waddell's ideas were published in the April edition of the British Medical Journal in 1959, Singapore was still under British colonial rule. Waddell's hypothesis, if we could call it that, was a response to a previous article published in

January 1959, which had discussed the mild symptoms of diabetes among ‘peoples of the tropics’ (Diabetes in the Tropics 1959, 219). The second quote, extracted from an article published by a major news outlet in Singapore, discusses the diabetes risk profiles for the different racial groups in Singapore – Chinese, Malay and Indian. Backed by findings from new research, point to how being overweight increases the risk of getting diabetes, although for possibly genetic reasons, Indians and Malays, seem to be able to withstand this progression towards diabetes with weight gain.

What both of these quotes have in common are their preoccupations with difference, particularly with how certain groups – Asian, European, Chinese, Malay and Indian – are differentially affected by diabetes. The scientific consensus in 1959 was that Asian peoples (or rather Asian bodies) seemed to respond remarkably well to diabetes treatment compared to Europeans. It is important to note that the lens through which difference is perceived is embedded within a context of European colonialism, a pivotal moment in modern human history that saw the rise of scientific racism. European colonial powers mobilized ideas of difference to construct racial hierarchies, which in turn supported conquest and violence under the guise of ‘civilizing missions’ (Seth 2009, 2018). The implications of colonial racial thinking are far reaching. The vocabulary of racialized difference in Singapore for instance, endured even to this day, long after the British colonial administration had been dismantled. In fact, racial categories continue to form the basis of medical-scientific research, as exemplified in the second quote, and in public health policy, particularly in Singapore’s more recent effort to combat diabetes in the population.

This dissertation project critically examines the historical formation of racialized diabetes in Singapore. A small, relatively young island nation located in maritime Southeast Asia, Singapore presents an interesting case study in the study of race and disease for a few reasons. The first is that the public health discourse on diabetes has gained considerable traction in the years leading to 2020. While the disease itself has been part of public imagination since the National Kidney Foundation of Singapore was found in the early 1960s, it evolved into an urgent national problem in 2016 when an academic report projected the cost of diabetes on the Singapore economy to reach SGD 2.5 billion or approximately USD 1.8 billion by 2050, more than double the amount in 2010¹ (Khalik 13 April 2016). The urgency of the problem led to the Minister of Health declaring a War on Diabetes in 2016. The following year, the Prime Minister of Singapore echoed the concerns articulated by the Minister of Health in his National Day address. Specifically, the Prime Minister highlighted the severity of the diabetes problem within the Malay and Indian racial groups in Singapore, urging dietary and other lifestyle changes to improve the situation (Abu Baker 29 August 2017). This racialized articulation of the diabetes problem in public health discourse, as well as the attribution of its prevalence to ethnic-racial specific behavior (such as unhealthy Malay and Indian cuisine) is not entirely surprising, given the highly racialized nature of Singapore society (Chua 2003).

What is more interesting is how this War on Diabetes converges with the broader precision medicine initiative as well as the government's effort to develop Singapore's

¹ The cost comes from medical treatment (which is mainly subsidized by the Singapore government based on a universal health coverage model) and other indirect productivity related losses.

capacity as a key player in global and regional biomedicine², thereby engendering novel ways of thinking about race. For instance, while the War on Diabetes has primarily focused on the different rates of disease prevalence among racial groups in Singapore, it has also foregrounded scientific ideas on how Asian bodies are supposedly more susceptible to diabetes compared to Caucasian bodies (Boh 16 October 2017). This is not just a scientific fact that has implications for public health. In the case of Singapore, *Asian Diabetes* represents both a scientific and economic opportunity, where treatment for Asian diabetics across the globe can be developed in the tiny island nation with a diverse population that represents the broad Asian spectrum.

However, this convergence between the state cultivated bioeconomy (essentially an economy driven by biomedicine or biotechnology), diabetes and race represent a mere snapshot of the myriad of socio-cultural meanings associated with diabetes in Singapore's history. If we look as far back as the early 1900s, when Singapore was firmly under British colonial rule, diabetes was not necessarily racialized in the same way that we see today. Rather, the discourse pertaining to diabetes in British colonies including Singapore, reflected an understanding of the disease as being caused by the stresses of life for the newly 'civilized tropical man' (Charles 1907, 1059). Racialization in this case, was subsumed under narratives of civilizational hierarchy, a hallmark of 19th and 20th century colonialism.

² The Research and Innovation Enterprise (RIE) program, a five-year renewable program stretching decades back lists Advanced Manufacturing and Engineering, Urban Solutions and Sustainability and Services and Digital Economy as other important sectors. A total of SGD 19 billion (approximately USD 14 billion) has been allocated to the current iteration of RIE (which will run from 2016 to 2020), the biggest amount yet, and of that amount, 21% of that funding is allocated to Health and Biomedical Sciences, underlining the importance of biomedicine as a major driver of the national economy compared to the other identified sectors

The examples above provide a glimpse of the assemblage of actors, technologies and institutions in history that co-produce a racialized understanding of diabetes. They also demonstrate how racialization, which can be defined as in this case as the ascribing of racial meanings to a condition also unfolds with different levels of intensity, effects on social groups, and at multiple levels. What is not apparent from these very brief examples are the broader social, political and economic forces such as colonialism and at present, the growing bioeconomy, that shape the articulations of diabetes as a racialized public health issue. This dissertation adopts a historical approach to understand how diabetes emerged as a socially and politically salient disease entity in Singapore, beginning from the late colonial period from 1900 to 1965, spanning the postcolonial developmental years between 1965-2000, and finally the contemporary biomedical age from 2000 to 2020. More importantly, this dissertation investigates how race became entangled with diabetes in these different time periods, highlighting the social, political and technoscientific formations that drive the distinct forms of racialization over time.

In my broad inquiry, diabetes is treated not just as a medical scientific fact but also as an object of study that is inextricable from technoscientific and racial formations in Singapore and 20th century world history. In drawing out the formation of racialized diabetes, as well as and what diabetes means across history, I elucidate the network of expertise, technologies and systems that make diabetes a medical scientific fact, and most crucially, how it came to be understood and articulated as a racialized disease in Singapore. I argue that at different junctures of Singapore history, diabetes was entangled with different socio historical concerns, giving rise to different cultural and

discursive understandings of racialized disease. Making diabetes visible in Singapore society was linked to postcolonial development and nation building, population health and finally national biocapitalist aspirations. In each of these *epistemes*, specific practices, processes and ideas (including concepts and categories) precipitated associations between race and diabetes, thereby generating a constellation of meanings to both the disease and the diseased within the spheres of medicine, politics, and broadly society.

It is important to acknowledge that the meanings connected to racialized diabetes did not emerge out of a vacuum. In postcolonial Singapore, much of the vocabulary on race – specifically the categories of Chinese, Malay and Indian - was derived from when the island was under British rule beginning in the 19th century. Yet this racial language wasn't merely transposed into the later postcolonial and contemporary eras. The process of racialization as well as the meanings that emerged out of these processes shifted; while the racial categories in the diabetes discourse may be familiar owing to their persistence throughout Singapore history, they don't necessarily represent the same things.

This research draws from a resurgent strand of sociological literature that deals with race and the postcolonial condition. Julian Go's (2018) belief that a postcolonial lens for sociological studies of race is important not least because it calls for the excavation of colonial practices of racialization and their afterlives in racialized contexts outside of the United States. This point on unsettling black-white binaries that dominate the sociological study of race in the United States is echoed by Warwick Anderson, who argues for alternative conceptions of race and ethnicity in the global south to be taken

more seriously (Anderson 2014). Moreover, the postcolonial sociology of race perspective sensitizes scholars to seek subjugated epistemologies of racialized subjects (Go 2018). Thus, while race knowledge and categories may have been carried over from colonial periods and continue to shape contemporary public health policy for instance, a postcolonial approach attends to the ways in which these ideas on race are negotiated outside of formal and expert discourses. People living with diabetes for instance, may have different ways of enacting or doing (racialized) diabetes. The inclusion of these actors falls in line with Gil Eyal's (2013) notion of a network of expertise, which essentially constitutes multiple actors – medical experts, patients and those in between – who co-produce racialized diabetes.

In adopting a postcolonial perspective, Go (2013) warns against analytic bifurcation, that is the rigid separation between analytic categories such as metropole and colony, asserting the need to recognize reciprocal co-production of racial knowledge and identities. This relational principle paves the way for a translocal and transnational framing of race and scientific knowledge production, an approach that has also been advocated by historian of science Warwick Anderson (2002) in his postcolonial technoscience treatise. There are a few notable empirical research that have embraced this direction. Historian Suman Seth (2018) for example, demonstrates how race knowledge in the 18th century was as much a product of tropical colonial sites as it was the British metropole. It was in the former that ideas on race were sharpened and then exported to the center. Julian Go (2020) too attempted to capture the relationality in the creation of postcolonial institutions through tracing the origins of militarized policing in the US to its 19th and 20th century imperial projects in the Pacific.

This research also engages with the sociological scholarship that examines the history of racialization in Singapore. While there are scholars who have adopted postcolonial perspectives in their examination of the history of race in Singapore (see Goh 2008), they tend to analyze racialization as being driven by political-ideological forces and policy (Hirschman 1986; Chua 2003; Lian 2006; Chua 2009; Tong 2010; Hill & Lian 2013). A few works actually highlighted the role of science in the racialization of society. Notably, Lian Kwen Fee's (2006) examination of colonial discourses on race underlined the British colonial administrators' belief of Social Darwinism and racial essentialist characteristics which informed racialization. Daniel Goh (2008) traces the genesis of the racialized social system in Singapore and Malaya through highlighting the influence of anthropological knowledge in colonial administration. Others such as Michael Barr (1999) point to racial eugenics propagated by influential politicians such as Lee Kuan Yew in newly independent Singapore as a crucial factor that contributed to the extension of racial meaning to ideas of 'fitness', resilience, modernity and success in the postcolonial era (Barr 1999).

Altogether then, my dissertation represents a significant intervention in the wider scholarship on race and medicine for a few reasons. The first is that it expands on the scholarship on race in Singapore through the introduction of medicine, disease and public health as salient societal domains in the process of racialization, particularly in the late colonial and postcolonial period of the island nation's relatively short history. As explained preceding paragraphs, medicine, public health and the role they play in creating race knowledge have thus far escaped systematic sociological and historical inquiry. A couple of works stand as exceptions. Recently, scholars Loh Kah Seng and

Hsu Li Yang (2019) published an excellent historical account of how tuberculosis (TB) was managed in British Malaya and in postcolonial Singapore, revealing the utilization of racial categories in public health discourse that was intertwined with racist conceptions of hygiene. Sociologist Shirley Sun's (2016; 2020) research on 'personalized' medicine in Singapore, which explored the promise of medical treatment tailored to one's genomic make up, too highlights the socio economic and technological constraints to this public health vision that inadvertently reproduce scientific race in cancer research.

While their work certainly provided examples of the relationship between race and medicine, Loh and Yang (2019) did not necessarily go beyond this to explore the structures that reproduced racial meanings in medicine over time, nor did they explore the implications of racialization in public health. Sun's (2016; 2020) research certainly touched on the technoscientific and socio-economic structures that animate racialization. However, while there was indeed an extensive discussion on the historical racialization of the category 'Asian', Sun (2016) did not necessarily situate this process in relation to a particular medical or public health concern. My research therefore builds on these pioneering studies that deal with race and medicine in Singapore by critically examining racialization through a single disease, diabetes, which enables me to illustrate its changing racial contours over time, as well as point to the implications of this racialization on how we understand and approach public health at different junctures of history.

The second significant intervention for this dissertation research is methodological. Specifically, this I approach the analysis of racialization in medicine by

adopting a postcolonial technoscientific framing that prioritizes translocal and transnational relations of co-production, as opposed to a Singapore centric gaze. The latter approach tends to obscure the ways in which race and medical knowledge circulate within historical metropole-colonies, as well as contemporary global circuits involving scientists from different institutions and multilateral entities such as the World Health Organization. As I will demonstrate, knowledge and meanings surrounding diabetes from British India and England for instance, would manifest differently in British Malaya, and can loop back to British India and England, resulting in modified ways of understanding diabetes and race. This mode of translocal and dialogic co-production of race and diabetes knowledge is evident in Singapore's postcolonial history too. Last but not least, this dissertation research is significant for its contribution to the broader literature on race. Through my analysis, I propose a theoretical innovation in the process of racialization that considers seriously imagined futures. I will demonstrate that racialization in diabetes do not just draw racial meanings from colonial history, or the present. Racialization, particularly in medicine, also draws from imaginations of the future that tie in with ideas of national vitality, and economic aspirations.

A Brief History of Diabetes

Medical anthropologist Michael Montoya's (2011, 3) statement that 'diabetes is not one disease but many' rings true on so many levels. In medical circles, diabetes is acknowledged as a group of metabolic diseases that involve carbohydrate, lipid, and protein 'metabolism' (Karamanou et al. 2016). A key characteristic of diabetes is the high level of blood sugar in a person's body, also called hyperglycemia, which leads to a host of complications such as diabetic retinopathy, diabetic ketoacidosis, neuropathy

leading to foot complications (even loss of lower limbs), perinatal fetal losses for diabetic mothers, kidney disease, high blood pressure and stroke if not properly treated (Diabetes Complications American Diabetes Association). In diabetes, the main culprit for the elevated blood sugar levels is insulin, a hormone produced by beta cells located in the pancreas that facilitate the absorption of glucose from the blood into cells around the body to be converted into energy or stored for future use. There are three main types of diabetes: Type 1, type 2 and gestational diabetes. Type 1 diabetes or insulin dependent diabetes, is caused by the autoimmune destruction of beta cells that produce insulin. People affected by type 1 diabetes require insulin injections in order to control their blood sugar levels. Type 2 diabetes, which forms 90% of total cases of diabetes worldwide (Diabetes Basics International Diabetes Federation) is caused by insulin resistance or impaired production of insulin in the body. Gestational diabetes is associated with high blood glucose levels in women during pregnancy that may cause complications to themselves and their child. While gestational diabetes usually disappears after pregnancy, women affected and their child are at a higher risk of developing type 2 diabetes later in life (Diabetes Basics International Diabetes Federation).

One of the earliest writings about diabetes was found over 3500 years ago in an Egyptian papyrus that described a polyuric state, a condition where an individual produces an unusually large amount of urine. It was not until the 2nd century AD that Aretaeus of Cappadocia described similar symptoms using the term 'diabetes' - derived from the Greek word for syphon - to highlight how fluids did not necessarily remain in the body but passed right through resulting in an incessant flow of urine. Further

descriptions of the condition incorporated another characteristic of the urine of patients affected by polyuria. The writings of Sushruta and Charaka, physicians who worked during the golden age of Indian medicine circa 5th century BC revealed how upon observing how ants congregated around the urine and upon tasting the urine, they discovered its sweet taste. Sushruta and Charaka also noted that the disease mainly affected those who were overweight, gluttonous, indolent, as well as those who regularly indulged in sweet and fatty foods (Tattersall 2010).

Similar charges of diabetes afflicting those who followed a life of excess was found in 17th century Europe through the writings of English Doctor Thomas Willis, specifically in his aptly titled text *Diabetes, or the Pissing Evil*. The 17th and 18th century saw the association between diabetes and sugar strengthened as European physicians such Matthew Dobson conducted experiments to determine the constitution of diabetic urine. The high amounts of sugar in patients suffering from diabetes contributed to the understanding that the body was producing excess amounts of sugar, which led to various complications (including restlessness, nausea, thirst) and even death (Tattersall and Matthews 2010). In the early 19th century, German physicians Oskar Minkowski and Josef von Mering built on the hypothesis of excess sugar in the bloodstream when they managed to identify the pancreas as a crucial organ that produced secretions aiding in the metabolizing of carbohydrates such as glucose.

It was not until 1921, after many years and attempts at isolating the organic secretion responsible for controlling blood sugar levels that medical researchers in Toronto managed to successfully extract insulin from beef pancreas using novel biochemical methods. In 1922, the first clinical trial involving insulin injections was

conducted on a diabetic patient and it proved to be successful in managing the symptoms of diabetes (Tattersall and Matthews 2010). The discovery of insulin was not a panacea for diabetics. In fact, insulin treatment transformed diabetes from a rapidly 'fatal illness' (Tattersall 2010, p.10) into a chronic disease, one with a myriad of complications, some of which are severely debilitating. Moreover, the variegated responses to insulin treatment served to highlight the different types of diabetes. There are insulin dependent diabetics, where the body depends on exogenous administering of insulin to help metabolize sugar. This is known as type 1 diabetes and is widely accepted to be a result of an autoimmune reaction where the body does not recognize its insulin producing beta cells, thereby attacking them. There are also insulin resistant diabetics, whereby the cells in the body don't respond well to insulin and are therefore not able to absorb the glucose in the bloodstream. The latter condition, termed type 2 diabetes, was found to be most prevalent among individuals who were overweight.

Even though elevated blood sugar levels had been well established as the main culprit for diabetes and its attendant complications in the early 20th century, management of blood sugar levels remained impractical until the invention of test strips that allowed for clinical testing of glycated haemoglobin (hb1ac) using test strips in the late 1970s. This was an important technological intervention paving the way for epidemiological studies that were able to objectively monitor the impact of blood sugar management on diabetic populations. Studies such as the North American Diabetes Control and Complication Trial (1993) which focused on type 1 diabetes and the United Kingdom Prospective Diabetes Study which was set up in the 1970s did not just clarify the disease etiology and raise novel treatment regimens at a time where first world

governments were reckoning with the increased burden of the disease. The studies also made clear the linkages between diabetes and other conditions such as hypertension and heart disease under the umbrella of metabolic syndromes.

As of 2020, approximately 34.2 million or 10.5% of the total adult population in the United States have diabetes and minorities are disproportionately affected by the disease as seen in Figure 1 (National Diabetes Statistics Report, 2020). The diabetes epidemic is not restricted to the United States. A 2014 report by the World Health Organization states that globally, 422 million or 8.5% of adults aged 18 years and older have diabetes (WHO Diabetes Fact Sheet). A more recent report by the International Diabetes federation states that approximately 463 million adults have diabetes with the number expected to rise to 700 million in 2045 (IDF Diabetes Atlas 2019). The report shows that China leads the pack for the largest numbers of adults with diabetes, followed by India and the United States. Another report states that 60% of diabetics live in Asia (Nanditha et al. 2016), and if there is no intervention planned, both China and India will have approximately a quarter of billion diabetics by the year 2030 (Saeedi et al. 2019). As diabetes becomes more prevalent, the cost of managing it has also grown burdensome to families and governments. In China, about USD 26 billion is spent annually on diabetes-related medical cost (Gale 2010). Another report estimates that diabetes cost Singapore approximately 1 billion in productivity and medical costs and the number is predicted to rise to 2.5 billion in 2050 (Khalik 13 April 2016). When we juxtapose these narratives of cost with the racialized discourse on diabetes targeting Malays and Indians in Singapore, it becomes clear how these overlapping discourses operate to frame specific groups as problematic.

Characteristic	Total Percentage (95% CI)	Men Percentage (95% CI)	Women Percentage (95% CI)
Race/ethnicity			
American Indian/Alaska Native	14.7 (14.6–14.7)	14.5 (14.4–14.6)	14.8 (14.7–14.9)
Asian, non-Hispanic, overall	9.2 (8.0–10.5)	10.0 (8.3–12.0)	8.5 (7.0–10.5)
Asian Indian	12.6 (9.3–16.7)	13.9 (10.3–18.6)	11.1 (6.6–18.0)
Chinese	5.6 (3.9–8.1)	5.9 (3.5–9.8)	5.3 (3.2–8.8)
Filipino	10.4 (8.1–13.4)	10.9 (7.6–15.4)	10.0 (6.8–14.6)
Other Asian	9.9 (8.1–12.2)	11.5 (8.5–15.3)	8.7 (6.2–11.9)
Black, non-Hispanic	11.7 (10.8–12.7)	11.4 (10.0–12.9)	12.0 (10.9–13.1)
Hispanic, overall	12.5 (11.5–13.5)	13.7 (12.3–15.2)	11.6 (10.2–13.0)
Central/South American	8.3 (8.0–8.6)	9.2 (8.8–9.6)	7.6 (7.2–8.0)
Cuban	6.5 (4.6–9.2)	7.3 (4.2–12.5)	6.0 (3.6–9.8)
Mexican	14.4 (13.1–15.8)	16.2 (14.2–18.3)	12.8 (11.1–14.8)
Puerto Rican	12.4 (10.1–15.1)	13.0 (9.5–17.6)	11.9 (9.0–15.5)
White, non-Hispanic	7.5 (7.2–7.8)	8.6 (8.1–9.0)	6.6 (6.2–7.0)
Education			
Less than high school	13.3 (12.4–14.2)	13.0 (11.8–14.4)	13.6 (12.3–15.1)
High school	9.7 (9.1–10.4)	11.2 (10.4–12.1)	8.6 (7.9–9.4)
More than high school	7.5 (7.2–7.9)	8.3 (7.8–8.8)	6.8 (6.4–7.3)

Who has diabetes? According to the National Health Interview Survey by the Centers for Disease Control and Prevention and the U.S. Census Bureau:

- 14.7% of American Indians/Alaska natives
- 12.5% of Hispanics
- 11.7% of non-Hispanic blacks
- 9.2% of Asian Americans
- 7.5% of non-Hispanic whites 18 and older

Figure 1: Diabetes Prevalence Statistics in the US broken down by race and education

These alarming projections have led to new transnational collaborative efforts centering on alleviating the diabetes burden on ‘Asians’ led by research centers in the US and Singapore. At the same time, the prevalence of diabetes has been recognized by governments and corporations as a fertile area for research and development given the massive potential market especially for drugs and other forms of treatment. The

Ministry of Health in Singapore organized a Ministerial Conference on Diabetes which comprised medical experts and policy makers to brainstorm the ways to tackle the diabetes pandemic while looking for *opportunities* that may arise from this ‘problem’ (News Highlights Ministry of Health). Diabetes as a prevalent and chronic condition in this case is transformed into a source of potential value that the local bioscientific sector and government intends to exploit as it has done in the past (Waldby 2009; Clancey 2012).

On Racialization

Before taking a closer examination at the literature on race and disease, there is the matter of defining key terms, particularly racialization. Michael Omi and Howard Winant’s (2014) seminal text on the racial formation in the United States defines racialization as

...the extension of racial meaning to a previously racially unclassified relationship, social practice, or group. (Omi and Winant 2014, 13)

The authors elaborate that racialization can occur at different levels. European colonization and subjugation of colored people in the Western and Southern hemisphere in the 19th century for instance, represents a large-scale racialization, where racial meaning became transposed on new social and geographical terrains. On a smaller scale, racialization can happen when individuals draw from pre-existing knowledge to enact ‘racial interpellation’ (Omi & Winant 2014, 111), as is usually the case in racial profiling, where certain types of socially undesirable behaviors become associated with a racial group. Omi and Winant’s (2014) ideas describe how

racialization can manifest at different levels of society. More importantly, their theory on racial formation elucidates the racial projects that are essentially systematic efforts to impute racial meaning into social structures, which in turn engender the construction of racial identities, meaning and difference based on visually perceptible phenotypical characteristics.

Omi and Winant's (2014) view on racialization is echoed by other scholars. Robert Miles (1989) defines racialization as the process in which social relations are shaped by 'the signification of human biological characteristics in such a way as to define and construct differentiated social collectivities' (75). Miles (1989) however, pays closer attention to the question of *who* gets to apply and enforce definitions of race in society. He further argues that the construction of the racial other entails the recognition of the self as being racial. There are two implications to this observation. The first is that Miles (1989) highlights the significance of the actor and the importance of power in the enactment of racialization. Secondly, the reciprocal dynamic suggests a pathway to understanding the prevalence of racial thinking; only when one thinks of themselves in racial terms, can they even begin to racialize others. This supports Omi & Winant's (2014) assertion that race has turned into the 'master category' to make sense of social life and organize action, a fact that is true in the United States, but also in other similarly racialized societies such as contemporary Singapore and colonial British Malaya.

Eduardo Bonilla-Silva (1997) expands the scope of racialization, pushing for the inclusion of structural analysis of race relations; a racialized order, Bonilla-Silva contends, should comprise both the racial discourse as well as the structure of race relations characterized by hierarchy and subordination. This is certainly the case in the

United States. In Singapore, studies on the historical racialization of society such as that by Lian Kwen Fee (2006) and Daniel Goh (2008) point to the British colonial government as progenitors of racial knowledge in the region. The British colonial administration created a racial order based on anthropological expertise (Goh 2008) and notions of social Darwinism (Lian 2006). However, the British also structured hierarchical social relations based on a racial division of labor³. Racialization therefore occurred at both the ideological and material levels in the Singapore context. The postcolonial government in Singapore would formalize this racial language through racial management policies, which in turn gave rise to a racialized system and bureaucracy (Lian 2006). More importantly, the ideas on racial abilities and capacities which arose in colonial times stuck and got carried over to contemporary Singapore society. This has been found to be integral in one's perceptions of racial others, and in structuring interracial relations (Lian 2006). Yet the centrality of race in all aspects of social life should not be construed as a totalizing force.

While the previous works focused on the different levels and dynamics of racialization, Theo Goldberg (1993) adopts a Foucauldian approach to argue how a

³ The British, like most European colonialists in the 18th and 19th century, held a social Darwinist belief where the populations of color were deemed as being in need of help from the naturally superior colonizers to progress. They also subscribed to anthropological conceptions of racial groups as having distinct physical and character traits. The Chinese for instance, were seen as industrious and hardworking whereas the indigenous Malay population in Malaya were seen as lazy and not fit for certain types of work such as that in the field of commerce (Lian 2006, p.221-2). These Darwinist conceptions of race would be echoed by Lee Kuan Yew and Mahathir Mohamad, both influential figures in post-colonial Malayan politics, when they expressed similarly essentialist ideas on race that translated into controversial policy (Barr, 1999; Lian 2006). Both Lee and Mahathir believed that the Chinese populations in postcolonial Malaysia and Singapore were more successful than Malays because of the former's inherently resilient and resourceful character shaped by a history of hardship and immigration.

racialized discourse provides meaning to create the racialized subject through forms of power/knowledge relationship. The racialized discourse is not just a template for cultural meaning; it structures a social hierarchy which constitutes racialized bodies, thereby resulting in exclusions in various domains of life such as the labor market or nation building projects. Yet Goldberg (1993) does not consider the racialized discourse to be a totalizing influence. Racialization can engender a 'counter assault a ground or a field for launching liberatory projects' (Goldberg 1993, 211). Thus, viewed through this perspective, the connection between race and disease might also serve social justice projects that elucidate the health disparity between racial groups for instance (Williams 2012).

This brief excursus into racialization is necessary in order to proceed with a critical analysis of the extant scholarship covering race, disease and medicine. For one, it elucidates the various dimensions that should serve as meaningful heuristics for understanding racialization. How does racialization happen? What are the sites in which racialization occurred? Who were the actors doing the racializing? What structures and institutions enabled racialization? What were the racial groups affected in the process and how did they react? While racialization can simply be understood as the establishment of racial meaning into hitherto racially unclassified relationship, social practice, group or in this research, disease, these guiding questions should reveal a richer landscape of racialization.

Race x Disease

I draw from several strands of literature to build my inquiry. The first is that of the history of medicine, diseases and race. I consider this strand of literature separate from studies on 'race science' exemplified by the works of Nancy Stepan (1982), Stephen Jay Gould (1996), Hammonds and Herzig (2009), and Jenny Reardon (2009). While these studies also adopt a historical perspective, they mainly focus on the formation of racial knowledge in science. This is not to say that scholarship on race science is not useful for this dissertation research. Undoubtedly, some of the ideas on racial taxonomies and bio-genetic difference highlighted by the aforementioned authors would seep into medical discourse relating to disease. However, works by Keith Wailoo (2014), Keith Wailoo & Stephen Pemberton (2006), Anthony Hatch (2016) and Arlene Tuchman (2020) are more immediately relevant to this research because they deal with the central question of how specific diseases come to be associated with specific racial groups in history.

All of the aforementioned authors approach the question of race and disease differently. Keith Wailoo (2001) adopts a social and historical construction of disease and illness perspective (see also Aronowitz 1998; Jutel 2009; Conrad & Barker 2010) to elucidate the meanings that emerge from the intersection between sickle cell anemia (SCA), medicine, American society and Blackness spanning the 20th century. Wailoo (2001) paints a convincing picture of the evolution of SCA and its increasing visibility in the American socio-political fabric. He traces the racialization of the disease to the interaction between clinicians, medical researchers and African American patients that contributed to SCA being understood as a predominantly Black disease in the first half

of the 20th century. This association between Blackness and SCA became strengthened as biomedical notions of Blackness and SCA diffused into more publicly accessible discourse via politicians and civil rights activists in the 1960s and 70s, along with claims about racial injustice and the non-recognition of Black pain. It is important to note here that while racialization of SCA initially occurred in the realm of medicine, Wailoo's (2001) work demonstrates how racialized disease becomes imputed with various meanings at different times in history and in different domains of society. The association between race and disease for instance, became less an object of scientific curiosity and more of an urgent call to alleviate Black pain as the mode of Black politics in the civil rights era too shifted from 'accommodation' and 'moderation', to radical and 'militant' methods (158-9).

Wailoo & Pemberton's (2006) study utilizes a breadth of archival sources including reports in medical journals and organization reports to reconstruct a broad cultural history of race and disease. Specifically, they examine three diseases that are known to be associated with specific racial groups in the United States diseases – Cystic Fibrosis for White Americans, Tay-Sachs disease (TSD) for American Jews and SCA for African Americans. This sample of diseases is unique because it comprises conditions that have genetic and hereditary components. Racialization in Wailoo & Pemberton's (2006) work therefore accrues a genetic facet that firmly grounds racial difference and susceptibility to disease in biology. Moreover, the prevalence of hereditary disorders in certain racial groups allow for a close examination of disease eradication efforts which in turn become entangled with identity politics. In the case of

American Jews who were most susceptible to TSD⁴ for example, Wailoo and Pemberton (2006) explain that community mobilization beginning in the 1970s culminated in the establishment of the Dor Yeshorim nonprofit which sought to educate the American Jewish community on TSD while also providing access to newly available genetic testing and genetic counseling for Jewish couples who were expecting or planning to get pregnant. Although the program was widely successful, proposed solutions such as abortion for fetuses with a high chance of having TSD raised concerns amongst the religious segment of the Jewish population. Thus, where racialization quite often centers on phenotypical features, this example presents a more complex picture where religious beliefs as well as narratives of ancestry, characteristics that are usually reserved to describe ethnicity, are folded into the process. While American Jews are generally considered to be racially White, they become ethnicized when discussed in relation to TSD.

Anthony Hatch (2016) combines critical race theory, biomedicalization as well as Foucauldian biopolitical perspectives to understand how metabolic syndrome came to be recognized as a Black 'problem' in the United States. In this schema, racialization constitutes the actions of government institutions such as the Office of Management and Budget (inclusive population health data) as well as scientific practice (the molecularization of race in particular) which aided in defining sickly black bodies but also contribute to their surveillance and regulation. The individualizing tendency of these paradigms shifts the blame of metabolic illness to Black genetics and/or behavior while

⁴ TSD is a disorder that attacks and destroys nerve cells in the brain and the spinal cord. Like SCA, TSD is an autosomal recessive disorder, meaning that a person will have the condition if they inherit two mutated genes, one from each parent.

obscuring structural and historical factors contributing to disease(s). Moreover, because metabolic conditions such as diabetes are endemic and chronic, susceptible black bodies emerge as highly profitable sites of intervention for the biomedical industrial complex which constitutes 'government intervention, scientific disciplines and capitalist expansion' (Hatch 2016, 7). Hatch (2016) marries the concern for health disparity with the political economic framing connected to biomedicalization, thereby pointing to underlying factors that animate the racialization of disease. Hatch's (2016) *Blood Sugar* adopts a more cautious tenor in his analysis of the process and effects of racialization in contemporary United States. Where Wailoo (2001) and Wailoo & Pemberton's (2006) works elucidate the complex dynamics of racialization and how racialized disease can be transformed into a site of contestation and even empowerment for marginalized communities, Hatch (2016) contends that racialization buttressed by the combination of forces described above relegates investigations on the 'social determinants' of disease and illness in the African American population (Phelan, Link & Tehranifar 2010; Williams 2012).

Arlene Tuchman (2020) takes a different direction from the previous studies in examining the association between race and disease. Instead of focusing on the fortunes of a particular racial group and how it related to specific diseases, Tuchman (2020) analyzes the medical scientific and the media discourse to explore the differences in how the diabetes problem was articulated for different racial groups in the recent history of the United States. In the early 20th century for instance, diabetes which mainly affected the Jewish population was explained to be a result of problems with acculturation (immigration stress) and behavior (indulgent, 'fat Jew'). However, diabetes

would take on a positive meaning as the proportion of diabetics increased among White Americans during the interwar period. In fact, because being diabetic meant having to control one's dietary intake and various aspects of one's life, the image of diabetes was effectively rehabilitated and White diabetics came to be saluted as possessing the necessary qualities of a 'good citizen' (Tuchman 2020, 34). Tuchman (2020) demonstrates how racialization occurs but beyond that, she highlights the shifting valence in the meanings attached to disease as associations with new racial groups begin to take shape. Conversely, Tuchman's (2020) analysis of White racialization of disease pointed to inadvertent implications on African Americans. The lack of effort to identify the prevalence of diabetes among African Americans given its status as a disease of the 'wealthy' and 'civilized' (Tuchman 2020, 74) meant that the affliction remained underdiagnosed in Black populations.

Tuchman's (2020) book on race and diabetes, like the other works I have covered thus far point to the different practices that constitute the racialization of disease, as well as the actors and technological factors that drive the process. This is especially prominent in the works of Hatch (2016). Beyond highlighting the different ways in which diseases come to be associated with race however, these studies describe the complex dynamics of racialization and the changing meanings that attach themselves to disease. These shifts are animated by socio political changes to the understanding race which can emerge from the ground as seen in the case of Wailoo's (2001) study of the Black politicization of disease. There are limitations to the works that have been discussed. For one, while they offer useful perspectives and methods on racialization and disease, they are bound by specific socio cultural and political

configurations that engender a uniquely American perspective. For example, while the aforementioned authors carefully ground their understanding of race within specific cultural, historical and institutional contexts, physical difference and especially color remain important markers in their analysis of racialization. Wailoo & Pemberton's (2006) text represents the exception to this rule in the way that they problematized the racialized identity of White American Jews. Regardless, analyses of racialization should not be limited to the examination of physical characteristics alone since racial identity often overlaps with claims to shared ancestry, a distinctive history or cultural practices, all of which are tied to ethnicity (Cornell and Hartman 2006). This is especially salient in contexts outside of the United States, where transposing an American centric perspective on race (as separate from ethnicity among other things) might obscure its unique operation (Loveman 1999).

My second criticism of the literature on race and disease is related to the first. In order to better capture racialization of disease in Singapore, it is crucial that we attend to its history of racial formation. This entails the adoption of a framework that is sensitive to colonial race-making practices and how the colonial project continues to influence race discourse in contemporary settings (Go 2018). This is where the postcolonial perspective on race is useful for this research. Julian Go (2013) defines postcolonial theory as a '...loosely coherent body of writing and thought that critiques and aims to transcend the structures supportive of Western colonialism and its legacies' (2013, 29). Go (2013) explains that while the postcolonial perspective has not necessarily gained traction in American sociology, it lends useful perspectives for the study of race. A postcolonial sociology of race seeks to broaden the understanding of race through

engaging with a wider spectrum of empirical cases while critically analyzing historical and contemporary forms of imperialism (Go 2018). It is worth reiterating that while a postcolonial sociology of race interrogates the political, economic and cultural logics associated with the history of empire and racial formation, it is undoubtedly driven by present concerns (Go 2013; 2018). This might take the shape of health disparity between racial groups or the continued circulation of racist stereotypes in public discourse, which is the case in this dissertation concerned with the racialization of diabetes in Singapore. Ultimately, the postcolonial approach seeks to ‘critique rather than authorize or sustain imperialistic ways of thinking’ (Go 2013, 31).

Aside from the postcolonial sociology of race perspective, my research borrows some ideas from Warwick Anderson’s (2002) *Postcolonial Technoscience*. Firstly, I seek to understand how technoscience in the form of theories, technologies and expertise relating to disease travel to postcolonial contexts. This does not simply entail the adoption of a diffusionist theory of modernization and science (which seeks to understand how ideas spread from the metropole to the rest of the uncivilized world). Rather, Anderson (2002) pushes for a recognition of the extant configurations of knowledge in specific contexts that shape the outcome of modernity and science⁵. Such a move represents an important step in the postcolonial approach given the unique colonial histories that contour the understanding of race and medical scientific knowledge in the ‘global south’ (Anderson 2014). Taking this direction does not mean that we dispense of colonial or ‘American’ conceptions of race, disease or medicine

⁵ From this standpoint, *all contexts*, including the European metropole in colonial history, adapt scientific ideas to produce unique flavors of modernization and science, hence Dipesh Chakrabarty’s (1992) call to provincialize Europe.

altogether. Rather, as Sanjay Seth (2009) argues, it is to recognize that these categories and concepts only provide a 'partial understanding' of the phenomenon in postcolonial contexts (ibid 2009, 336).

To add to this point on the decentering of knowledge production, Suman Seth (2018) reminds us that as much as medical scientific knowledge relating to race may have been transposed into the 'tropics' by colonialists, it was in these peripheral sites that these ideas were sharpened, thereby contributing to a looping effect and remaking the metropolises as we know them to be. This idea of a mutually constitutive relationship between the metropole and colony is similar to Go's (2013) program for postcolonial sociology. Go (2013) argues that a postcolonial sociology should adopt a relational perspective, one that addresses the analytic bifurcations that characterize much of institutional sociology. By this, he means that sociological analysis should not treat the metropole and colony as discrete categories. Rather, the metropole and colony should be seen as being embedded within a larger network of relations. If we apply this framing to ideational categories, concepts such as race and disease should be understood as being co-produced by multiple 'actants' – to borrow from actor network theory - in a network. Go's (2013) call for a relational approach ties in with another point in Anderson's (2002) postcolonial technoscience.

For Anderson (2002), the postcolonial technoscientific perspective calls for a rejection of totalizing categories such as 'colonial discourse', 'imperialism', 'race' and the 'nation' in favor of 'an empirical study of the translocal co-production of technosciences and social orders' (Anderson 2002, 647). What this entails is a transnational understanding of technoscience, one that is attuned to distribution of

power as the case of Gabrielle Hecht's (2012) study of nuclear technopolitics in Francophone Africa, or Kausik Sunder Rajan's (2017) examination of the globalization of intellectual property rights impacting the pharmaceutical industry in India, both of which illustrate the inequities in the global and regional circuits of technoscientific power. The postcolonial technoscientific perspective also urges sensitivity towards non-colonial forms of domination or 'subimperialism' – defined by Chen Kuan-Hsing (2010) as the lower-level reproduction and practice of imperial ideologies - that feed on a selective interpretation of postcolonial thinking.

Essentially, subimperialism entails a 'way to establish oneself within the global hierarchies by doing to "lesser" others that which has been-or continues to be-done to the doer' (Liu 2017, 564). Two examples of this tendency come to mind. The first is the wholehearted rejection of colonial or 'western science' in favor of Hindu/Vedic nationalism that reproduce oppressive caste subjugation as the case in Meera Nanda's (2003) work. Another salient work by Jennifer Liu (2017) centers around the refashioning of marginalized indigenous people in Taiwan into subimperial subjects through the extraction of their valuable genetic material, in the name of advancing 'Taiwanese science'. In both of these cases, nationalism and the meaning of citizenship comes to the fore as new modes of understanding the self collides with governmentality (Miller & Rose 1990), and to a larger extent, postcolonial sovereignty in the genomic age (Benjamin 2009). Subimperialism and the postcolonial perspective breaks free from localized racial hierarchies and provides us with an expanded scale for understanding race and disease.

From Archives to the Everyday

I will provide a brief overview of the methods in this section but more precise details of the data collection and analysis are provided in the chapters. The dissertation research utilized a mixed methods approach. The project is mostly based on an analysis of content and archival material, supplemented with two field work stints in Singapore during the summer of 2019 and 2022 where I conducted in-depth interviews with biomedical experts involved in the War on Diabetes, as well as individuals living with diabetes. During those two summers, I also examined archival material from The National Archives in Singapore. This comprised hundreds of digitized and physical versions of government reports, public health communications on diabetes, media publications, photographs and oral interviews that date back to the early 1900s. Altogether, this enabled me to highlight the different facets of diabetes and the workings of public health particularly in the late colonial and postcolonial time period between 1900s to the 1990s.

Aside from the National Archives, I also examined records and reports of relevant state affiliated institutions such as the Ministry of Health, the Prime Minister's Office, the National Kidney Foundation, the Agency for Science, Technology and Research and parliamentary proceedings to understand the various ways in which the relationship between race and disease have been built up and sustained at the institutional and national levels. These documents can be found online. I pay attention to the articulation of racialized disease that forms part of the discourse on diabetes in postcolonial Singapore, while also tracking the various state led initiatives that aim to eradicate the diabetes problem. This extended analysis of agencies that are involved in the diabetes

problem allowed for the reconstruction of the institutional diabetes landscape that include actors such as medical researchers to economic planners.

Lastly, I examine scientific publications and press releases beginning from the late colonial period of 1900 that focused on diabetes in the Singapore population to trace the production of diabetes and its attendant meanings, as well as to highlight the shifts in these meanings and their impact on larger society. This includes reports written by well-travelled physicians within the British Empire, as well as reports and policy papers by multilateral organizations such as the WHO and the International Diabetes Federation, all of which align with my goal of capturing relationality in the process of translocal and transnational racialization. These publications and press releases are also available in online databases such as PubMed and the WHO Institutional Repository for Information Sharing. Again, details of the search will be provided in the chapters. In conducting archival research, I am essentially embarking on a form of 'historical ethnography', defined by sociologist Diane Vaughan (2004, 321) as an "...attempt to elicit structure and culture from the documents created prior to an event in order to understand how people in another time and place made sense of things".

Conducting historical ethnography means my research approximates the work of social historians and anthropologists who examine how cultures shape ways of thinking in a specific historical time period, through the analysis of primary and secondary sources. I treat culture as a bundle of discourses that are shaped by multiple actors, institutions and traverse boundaries. Thus, while the crux of the analysis in this research may focus on the construction of diabetes throughout Singapore's history, I extend my relational approach to doing historical ethnography by also attending to the

transnational 'qualitative networks' that connect knowledge centers such as that described by Michael Fischer (2018), as well as the scaling of meanings related to disease in Singapore with regional or continental forms of identification (see Ong 2016). Yet this research retains its sociological identity through an emphasis on socio-cultural formations pertaining to race and medicine as a central object of analysis, as well as through a more conscious effort at engaging with theoretical frames such as racialization and expertise to interpret historical data (Vaughan 2004).

In embarking on historical ethnography, I pay close attention to what Ann Stoler (2010, 20) calls the 'archival form', described as 'prose style, repetitive refrain, the arts of persuasion, affective strains that shape "rational" response, categories of confidentiality and classification, and not least, genres of documentation'. Sensitivity to the archival form allows the researcher to delve into the logics and principles that undergird archive making. Moreover, I believe that this approach is also applicable to the examination of contemporary content in the form of media publications (particularly those that focus on 'objective' public health issues) and of course scientific publications. The ideas behind 'archival form' run parallel to that of critical discourse analysis which aims to elucidate assumptions that underlie discourses and ideologies in media narratives as well as scientific documents. This allows for a critical understanding of the conditions, systems and principles that organize the content of discourse – 'what is said and what is left out' (Baker & Levon 2015, 233) - that reflect broader configuration of power in society (Foucault 1971).

The field work component in my dissertation research attends to the contemporary experiential aspect of diabetes in contemporary Singapore. To

understand how race becomes solidified in the biomedical sciences, and extended into public health and clinics, I conducted a total of 22 interviews that comprised a wide range of scientists including scientists working on the biology of diabetes, public health researchers, researchers involved in the national precision medicine initiative which serves as a novel platform to combat diabetes through genomics, and finally clinicians who treat people with diabetes. I am cognizant of the fact that the scope of data in my dissertation is very much contained within the realm of 'experts'; the archival information, the news articles, the government reports, the policy papers, even the interviews, these all seem to uphold and reproduce an authoritative cultural history of racialized diabetes in Singapore.

A simple response to this is that it was intended that way. There have not been critical sociological and historical research on chronic diseases such as diabetes and public health in Singapore, and the only way in which a system of racialization and its impact on society can be effectively critiqued is to engage with the authoritative sources of knowledge, the dominant discourse, to the fullest extent. That said, I am aware of the need to cast a spotlight on, as mentioned earlier, the 'unsaid' in interrogating discourse and not just by pointing out to the gaps in historical record. Through my observations and in-depth interviews with 7 individuals with diabetes, I 'multiply' diabetes, to paraphrase Annemarie Mol (2002), and in doing so, push back against prevailing narratives on diabetes with practices and experiences that have hitherto only inhabited the margins of discourse, bringing to life what would otherwise be 'disabled histories' (Stoler 2008).

A Roadmap to the War

How did diabetes come to be so closely associated with race in Singapore? What are the different ways in which the disease came to be racialized over the course of the nation's history? What are the various expertise, technologies and systems embedded within different epistemes that shape the various racialized articulations of diabetes in Singapore's history? These are the questions that will drive the five remaining chapters of this dissertation. As stated earlier, at different junctures of Singapore history, diabetes became entangled with different socio historical concerns, which in turn engendered different cultural and discursive understandings of the disease. Across Singapore's relatively short history, diabetes was racialized in different ways; within the medical scientific, public health and political discourse, the disease was always articulated in racial terms, and imbued with racial meaning.

Part of this is attributable to Singapore's colonial history under the British, where racial categories, meanings and policies were introduced as a way to divide and rule. Chapter 2 discusses this in great detail. Specifically, I describe the landscape of race, disease and public health during the period of transition from late colonial era circa beginning in 1900 to the early years of independence up to 1970. It is important to note that the racial categories and meanings linked to diabetes did not spring from just Singapore or even British Malaya. Rather, racialized diabetes that manifested in Singapore emerged out of debates involving physicians from all over the British empire. The remainder of the chapter builds on this history of transition, exploring the role of the newly independent Singapore state in constructing narratives of race and diabetes. Examining the scientific literature, global public health reports and press releases

relating to diabetes between 1960 to 1990, I describe how diabetes was made legible in the local clinical setting, but more importantly how it also accrued cultural and political meanings. I term these combined processes *developing* diabetes to describe how diabetes knowledge became imbricated with global ideas of development and population health a process that gave rise to an unexpectedly idealized image of the disease in postcolonial Singapore. At the same time, the “thrifty gene” hypothesis which was extensively discussed in the medical scientific literature reanimated familiar ideas on the suitability of racialized bodies for modern life, previewing an emergent mode of racial biopolitics that would peak after the 1990s.

Chapter 3 represents a different era where the development imperative has somewhat faded. Here, I examine new narratives of racialization that emerged between 1980 to the 2010s, this time centering on notions of bodily discipline to maintain individual and national health, but enacted through a very specific platform – healthcare financing. In this chapter, I ask how does healthcare financing as a technique of power engender emergent racialized meanings in public discourse? In this chapter, I posit the development of an *insurantal imaginary*, defined as a social context in which profitable, useful and necessary uses can be found for insurance technology, as a condition which engenders the articulation of the sickly, idle and risky minorities within Singapore’s discourse on diabetes. The narrative of sickly, idle and risky minority bodies as a disciplinary technology could not have emerged in the previous healthcare financing system based on forced savings and government subsidy. Rather, it was the introduction of a universal national health insurance system and risk pooling in 2015 which catalyzed an insurantal imaginary that together with the existing racialized

structures, enabled a moralizing language of racialized responsibility and accountability for minority racial groups whose health woes are deemed as burdensome to the nation.

Chapter 4 takes us to a more recent period in Singapore's history – the War on Diabetes that was launched in 2016. In this chapter, I utilize a combination of public health data media reports, policy papers and interviews with key scientists in the War on Diabetes effort to try to describe the ways in which the War on Diabetes narrative is racialized. Additionally, I examine the disease ecology and the public health metrics that were mobilized to make diabetes *the* face of public health in Singapore. Here, I assert that the public health data does not clearly indicate why diabetes should be the priority disease in Singapore's public health system and broader society, given that there were other diseases that contributed more significantly to the burden of disease statistic. The point of my analysis is not to determine whether experts were right or wrong in focusing on diabetes as a national public health issue. Rather, through employing the social constructionist lens, I wish to highlight how biomedical 'facts' became entangled with economic factors and institutional dynamics that led to the elevation type 2 diabetes into an urgent public health matter. By economic factors, I do not just mean the introduction of public health language and policies that push for techniques of self-management and care that minimize state expense on healthcare. Beyond this, I present other ways in which the diabetes problem and the racialized population in Singapore have been figured as resources under a regime of what Kaushik Sunder Rajan calls biocapital, particularly as the state has identified Asia and the emergent issue of Asian Diabetes as a potential market for therapeutics developed in Singapore and using its diverse population.

Chapter 5 continues this thread of Asian Diabetes that was introduced in chapter 4 but approaches at the issue from a different angle. Focusing on the media discourse in particular, I explore how the idea of Asian Diabetes is constructed in public facing discourse. This chapter builds on existing studies that demonstrate how biomedical researchers construct multiethnic populations as biovaluable, thereby allowing for the scaling of disease research and treatments to other countries. This “fact” also serves an important role to attract investments in Singapore’s bioscientific sector. However, what hasn’t been explored is how such promissory narratives are translated for public consumption, an important step given how science policy requires public buy-in. Here I asks how the relationship between Singapore and Asia is constructed as biovaluable through the media and I find that the construction of biovalue in the media relies heavily on emotional and pragmatic appeals to Asian inclusivity in scientific research, highlights biological Asian difference and market opportunities based on scaling, and enacts the connection between Singapore and Asia in a distorted manner where the minority Indian and Malay populations are sometimes excluded. Thus, while Singapore’s diverse ethnoracial population is constructed as an advantage, this exclusion reflects inconsistencies in the state’s much vaunted multicultural policy while at the same time capturing the biases in its geopolitical and economic priorities.

The concluding chapter is unconventional in that it combines a self-reflexive note on the limitations of my research with an exploration of diabetes that falls outside of this formal and authoritative discourse that I have sought to unpack in chapters 2 through 5. Borrowing Annemarie Mol’s (2002) idea of multiple ontologies, I ‘multiply’ diabetes by homing in on the everyday practices and narratives of people living with diabetes. I

discuss three distinct cases based on a combination of in-depth interviews and observations, highlighting the different ways of *doing* diabetes that center around daily routines, management of the body, dealing with shame, and finally the weaving of religious beliefs and practices into diabetes. The inclusion of these cases is meant to be a way, as mentioned earlier, to supplement the ‘disabled histories’ (Stoler 2008) of race and diabetes while also laying the foundation for a future ethnography of racialized diabetes I aim to carry out as part of my extended book project.

Chapter 2: From Colonial Racial knowledge to ‘Developing’ Diabetes in Postcolonial Singapore.

This chapter begins by tracing the formation of racial knowledge in colonial Singapore, and how it was incorporated into the medical literature on diabetes. In doing so, I attempt to elucidate the historical mechanisms through which diabetes becomes racialized during a period of transition, that is between the late colonial era to the early days of postcolonial independence for Singapore - 1900 to 1970. Beyond this period of transition, I analyze the increasing visibility of diabetes in medical and public health discourse through a particular medical scientific theory – epidemiologic transition. The theory of epidemiologic transition grew into a highly influential perspective in global health discourse during the second half of the 20th century. Yet the significance of this theory was not just confined to the realm of medicine. Examining the aftermath of transition, from 1970 to 1990, I point out that in the context of Singapore, epidemiologic transition extended beyond a public health frame that was used to make sense of chronic diseases such as diabetes. Crucially, it was mobilized by the postcolonial political elite to make certain claims relating to national progress.

Highlighting diabetes as a social problem contributed to the increased visibility of diabetes *the disease* – its symptoms which span from acute thirst, sugar in urine which supposedly invites ants into the toilet or urinal (see figure 1), unhealing lesions and even coma leading to death. Yet this proliferation of ideas and symbols also drew attention to the subjects of diabetes – diabetics - as a new classificatory category in the Hacking-ian (2007) sense, which in turn presented a kind of tabula rasa moment ripe

with political and cultural opportunity. Diabetes, particularly when unmoored from its clinical origins and thrust into public discourse, became entangled with a web of meanings and imaginaries unique to the postcolonial period in Singapore.

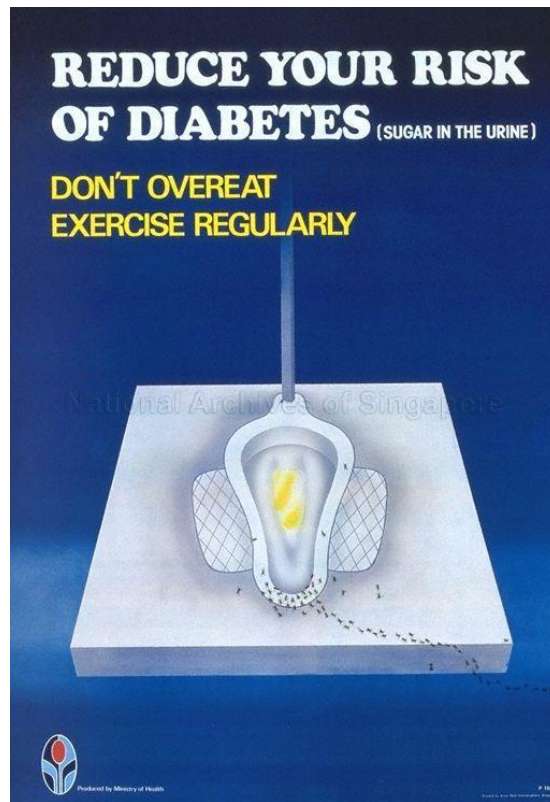


Figure 2: Diabetes campaign poster

As it became increasingly clear in the global public health landscape circa 1970 that diabetes was a condition that affected developed nations, diabetes as an emergent public health and social problem in the island nation was repurposed by key government and public health actors as a marker of developmental *progress*. Diabetic bodies, and the litany of problems they presented to the public health system did not necessarily reflect a mismatch between bodies and modalities of development, as was argued by colonial physicians in British India (Charles 1907). On the contrary, the

prevalence of diabetes reflects the economic affluence delivered by a nascent government that embraced development at any cost. Out of a crowded field of well-known tropical infectious maladies such as tuberculosis, cholera, typhoid fever, plague, smallpox, beri-beri, diphtheria and leprosy, diabetes emerged as a key candidate signaling the shift to the nation's developed status.

In making this argument, I am not attempting to downplay the seriousness of diabetes as a public health matter. Rather, I hope to bring attention to the multivalent character of the diabetes discourse, especially as it interacts with postcolonial concerns and global shifts in notions of development. It is important to also recognize that this repurposing of diabetes in the postcolonial public health discourse is situated within a history of a fraught and violent campaign of independence in 1965. If we consider this seriously then, the association between diabetes and postcolonial developmental progress can be understood as a political legitimizing strategy in a postcolonial national context as well as a case in which global public health ideas and theories became appropriated and mobilized. This chapter builds on existing scholarship which tend to focus the applicability of the theory of epidemiologic transition in real world situations (Janes 1999; Hill et al. 2007; Agyei-Mensah and Aikins 2010) as well as its teleological nature (Carolina and Gustavo 2003; Vaughan and Adjaye-Gbewonyo 2021), by highlighting how the epidemiologic transition becomes woven into political and cultural understandings of diabetes in the public health discourse in postcolonial Singapore.

The increasing visibility of diabetes in the political and cultural imaginary also speaks to the continued engagement with global health standards. In fact, the claim to postcolonial development could not have been made without the efforts to employ

emergent biomedical standards set by agencies such as the World Health Organization and the International Diabetes Foundation. Efforts to harmonize diagnostics and treatment with recognized guidelines, the building of transnational networks with better established medical research facilities, as well as the development of medical research capacity in Singapore formed a crucial part of the postcolonial modernization drive. It was not enough that Singapore grew affluent and experienced epidemiological transition. The way in which this was achieved also reflected a desire to be recognized in the global health landscape. In a way, the adherence to broader diagnostic and treatment standards, as well as the adoption of techniques such as epidemiologic surveys allowed for greater ease in mobility for diabetes as a medical-scientific object since standardization allows for diabetes in Singapore to be read and understood elsewhere (see Bowker and Star 2000). As a disease entity, diabetes is rendered transnational and global, laying the groundwork for the nation's ambition to establish itself as a bioscientific hub at the turn of the millennium.

Yet this narrative of postcolonial development did not translate neatly onto the population. As diabetes grew in political and cultural stature, the narrative of development converged with colonially derived racial ideas to engender a highly racialized etiology of diabetes. In particular, scientists sought an explanation for the higher prevalence and susceptibility of diabetes among the Indians in Singapore. The solution was found in the form of the thrifty gene hypothesis put forth by famed American geneticist James Neel in 1962: Indians whose ancestors left their homeland bearing the mark of poverty (in their genes) have found a life of affluence in Singapore and diabetes has become part of that progress. In short, development hit some racial

groups harder than others for genetic reasons. Attending to this detail in Singapore's public health narrative brings to the fore local and regional historical patterns that complicate the triumphalist narrative deployed by the state; the 'postcolonial' here is as much a critical reflexive position as it is a periodization in history (Anderson 2014, 381).

The Archive

To reconstruct how diabetes became more visible in the medical and public health discourse between 1900 to 1990 – what I consider to be the late and post-colonial stage in Singapore's history, I examined a combination of scientific papers, global public health reports, policy papers, press releases, government speeches and oral history records. This time period is important for a few reasons. The first is that it captures the public health orientation during the late colonial period (1900-1965), revealing the ways in which the colonial administration constructs the relationship between disease and conceptions of modernity. The period beginning in 1965 represents an important time as Singapore gained political independence and attempted, like many postcolonial nations, to build an identity outside of being a former British colony.

The policy papers, press releases, government speeches and oral history records were sourced from the National Archives of Singapore (NAS) where a catalog search was conducted using the search terms 'diabet*' or 'health*' between 1900 to the end of 1990. Although I mainly focus on the speeches and press releases (n=884) as a way to understand how the postcolonial state framed diabetes, the search also covered photographs, oral history interviews, audiovisual and sound recordings, speeches and

press releases, maps and building plans, posters and private as well as government records. The search term 'health' was included for two reasons. Firstly, it was because I also wanted to know what the broader discourse on health during that time period was, and where diabetes was situated within broader discussions on health. This will be presented in a section where I discuss diabetes in relation to other diseases in late colonial and postcolonial Singapore. Secondly, it just so happened that a lot of the older documents in the archival database were not tagged with diabetes, even if they contained the term diabetes. I then read through the speeches to identify mentions of diabetes, to narrow down the relevant primary sources for coding and analysis.

Although this chapter was intended to also identify patterns of racialization, the search term 'rac*' was excluded mainly because I wanted to explore the broader landscape of diabetes within this time period without limiting the search returns to material that had to contain both permutations of diabetes and race. While racial categories and ideas on race did manifest in the primary sources, there were also instances where the discussion on race were couched in ways that were not immediately obvious, for instance through articulations of civilization and development. The hundreds of speeches and documents from this time period were then carefully read and put through several rounds of coding, yielding three broad categories: 1) diseases affecting population 2) transition 3) public health and national progress. Given that the idea of epidemiologic transition and the diseases of developed vs undeveloped nations emerged as a key concern in elite discourse, the primary sources from NAS were analyzed alongside scholarly literature on the theory of epidemiologic transition.

The scientific papers for this chapter were sourced and compiled using the PubMed database. The search used the following terms: 'diabet* AND Singapore', spanning 1900-1990, yielding 126 articles. In a few cases, the author had to look at other databases for relevant papers (n=3) that were referred to by the papers compiled from PubMed. Mostly, these were articles that dealt with the thrifty gene hypothesis put forth by American geneticist James Neel, as well as one of the first epidemiological studies on diabetes conducted by medical researchers Hugh Wilkerson and Leo Krall based in Massachusetts. Again, race was not included in the search terms because this was meant to be a broad survey of the type of research that was conducted over the time period. Nevertheless, race did emerge as a salient concern throughout the time period, although as expected, the ways in which race was used differed significantly.

Much of the earlier research papers on diabetes were concerned with the role of the tropical environment on Asian bodies. Research in Singapore after 1965 tended to be more concerned with implementing new diagnostic standards and experimenting with new medication. Yet, race was also used, particularly in population surveys, even if their use was not prescribed by multilateral health organizations such as the WHO. This grew apparent as the analysis honed in on certain scientific personalities – such as Professor Cheah Jin Seng – whose extensive body of work and population health approach was instrumental in advancing diabetes as a racialized medical and public health concern in postcolonial Singapore.

Lastly, I examined publications and communications relating to diabetes from multilateral organizations such as the World Health Organization (WHO) and the International Diabetes Federation (IDF). These publications provided contextual

information, particularly with how the influence of global health institutions influence the standards and practice of diabetes treatment and research in Singapore. The publications were sourced from the WHO online archives (now iris or the Institutional Repository for Information Sharing) using the terms 'diabet*'. WHO was established in 1948 and one of the most important documents that was published was the Diabetes Mellitus report of a WHO expert committee in 1965, which was the year in which Singapore attained independence. Aside from this report, I also analyzed communications between scientists from the IDF and the WHO to trace how diabetes became an important disease at the world stage.

Race and medicine from late colonial to the early postcolonial era in Singapore

Before we move on to explore the convergence between race and medicine in colonial Singapore, the use of racialization as a conceptual tool needs to be clarified. Racialization is defined by Omi and Winant (2014) as '...the extension of racial meaning to a previously racially unclassified relationship, social practice, or group' (13). Their theory on racial formation highlights the racial projects that can be understood as systematic efforts to impute racial meaning into social structures. In the case of Singapore, these racial projects were inextricably linked with British colonial rule, where racial categories and classification systems guided and legitimized by the anthropological 'sciences' reflected the racist sentiments of the day.

In British Malaya, which Singapore was a part of, the British implemented a divide and rule policy based on certain racial ideas of the population. Goh (2008)

describes the extent to which anthropological ideas that were developed in the 19th and early 20th century permeated colonial thinking:

...the British saw the Chinese as economically useful but perfidious orientals to be kept out of the colonial body politic while the Malays were lazy but picturesque medievals to be advanced in civilization but political and agricultural training and the Tamils from South India to be cared for as docile savages working European-owned plantations. (Goh 2008, 235)

These anthropological representations informed the colonial state's racially pluralist worldview; the implication of this is that the state sees, to adopt James Scott's (1998) parlance, the population in distinct racial categories with essential cultural characteristics. In British Malaya, this 'split anthropological imagination' (Goh 2008, 236) of the Chinese and Malays formed the basis of a split colonial rule. Essentially, the British governor presided over protectorate government that incorporated Malay royalty and elites in the Peninsular Malay States. In the Chinese-dominated Straits Settlements comprising Penang, Malacca and Singapore, the system followed a Crown Colony government (Goh 2008). The protectorates were essentially limited self-governing entities which recognized the rule of the British Empire. Crown Colonies on the other hand, were directly ruled by the British Colonial Office.

Goh's (2008) idea of a split colonial rule overlaps with Lian's (2006) analysis of the racial division of labor in British Malaya. While Goh (2008) details the correspondence between the anthropological imagination and political systems, Lian (2006) proceeds to describe how it shape the labor landscape. Lian (2006) explains that the British conception of race was 'informed by ideas on social Darwinism, particularly

by the turn of the twentieth century when scholar-administrators like Hugh Clifford, Frank Swettenham and Richard Winstedt were influential figures in determining policy on social development' (221). Lian (2006) elaborates that embedded within this notion of social Darwinism, there is a teleological idea of progress as well as where the different racial groups sit in this trajectory towards civilization. This idea of teleological progress also shaped ideas on the capabilities of the different racial groups in the British empire – 'docile Tamil labour was ideal for the plantations; the self-reliant Chinese would be effective in commercial activities and the indolent Malay peasant was best left alone in the padi fields' (222).

These colonial ideas that emerged in British Malaya continue to impact the contemporary socio-political landscapes. In Singapore Goh (2007) notes that even after 50 years of decolonization in Malaysia and Singapore, 'ethnic relations and national politics still revolve around the racial categories used by the British colonial state to enumerate the population in its census' (235). In Singapore for instance, policies related to housing, political representation, schooling and even speech are shaped by these very categories; while they are undoubtedly colonial constructs, they have also become a fact in everyday Singapore life, impacting people in very real ways. But it was not just the categories that have endured. Scholars have pointed out how the cultural content of these categories continue to shape perceptions on the different racial groups.

According to Lian (2006), Chinese in both Malaysia and Singapore view Malays as 'lazy', 'backward' and 'uncompetitive', reproducing a long-held stereotype which Alatas (1977) has problematized. These findings have been confirmed by more recent research on perceptions of the racial other in Singapore and Malaysia, with the authors

even pointing to individuals internalizing the racial stereotypes aimed at their racial group (Reddy and Gleibs 2019). Part of the reason for this lie in the ideas propagated by political elite in postcolonial Malaysia and Singapore. Mahathir Mohammad, a medical doctor and the first Prime Minister of Malaysia expressed in his 1970 book *The Malay Dilemma* that Malay economic weakness relative to the Chinese and Indian racial groups was a result of the physical environment of the Malay peninsula; because it was so well endowed with food resources, 'even the weakest and less diligent, were able to live in comparative comfort with little exertion' (Lian 2006, 223).

His contemporary and nemesis, Lee Kuan Yew who was the first Prime Minister of Singapore echoed this racial and environmental perspective, explaining in an interview with an Australian radio personality that the Chinese and Malays in the Malay peninsula are different because the former is a product of a civilization that 'has gone through all its ups and downs, of floods and famine and pestilence' whereas the latter emerged in an environment with 'warm sunshine and bananas and coconuts' which did not require them to 'strive so hard' (Ashbolt and Lee 17 Mar. 1965). Such a framing of society was also observed in India and much of postcolonial Southeast Asia, a fact that is not entirely surprising given how anti-colonial nationalist campaigns were often led by medically trained actors (Anderson and Pols 2012).

In Singapore however, the main political protagonist during the immediate postcolonial period was not a medical doctor but a Cambridge educated lawyer. Yet this did not preclude Lee from adopting certain biological and medical ideas in discussing the body politic. He could be described as a late adopter of eugenics (considering that it was well out of fashion in North America and Europe after the second world war), as it

provided him the language to diagnose social ills and potential problems that might impact Singapore's survival as a vulnerable island nation (Palen 1986). Lee's brand of eugenics built upon, among others, Francis Galton's (1904) alarmist treatise, which called for a tighter control of the breeding of undesirables while encouraging those with higher pedigree to propagate. Lee also combined the language of eugenics with familiar ideas on race. Essentially, Lee believed that certain racial groups in Singapore are better suited to his ideals and vision of postcolonial national progress owing to their biological constitution and culture. This is best captured in the following quote:

Three women were brought to the Singapore General Hospital, each in the same condition and needing a blood transfusion. The first, a Southeast Asian was given the transfusion but died a few hours later. The second, a South Asian was also given a transfusion but died a few days later. The third, an East Asian, was given a transfusion and survived. That is the X factor in development. (Lee Kuan Yew in Barr 1999, 145)

The East Asian in this quote clearly refers to the Chinese population in Singapore, South Asians the Indians and Southeast Asians most likely corresponded to the 'native' Malays. Development according to Lee isn't just a matter of effort and adhering to a capitalist ethos a la Weber's (2001) Calvinists. Development and the capacity to develop in Lee's description, literally coursed in East Asian veins. Such a racial essentialist stance on notions of progress and development are not new. In fact, we can identify debates on the 'fitness' of certain racial groups in late colonial era literature on diabetes.

On Racialized Diabetes in the Late Colonial Era

While not exactly set in British Malaya, a certain Sir Havelock Charles, physician with the rank of lieutenant colonel who also served as professor and surgeon at the medical college Calcutta, India in the early 1900s, wrote about diabetes in the tropics, published in the British Medical Journal. In it, Charles (1907) details how the various populations in India – the Chinaman, Bengali, Punjabi, Marwari, Mussulmans, Beharis and Sonthals – were differentially susceptible to diabetes with the Bengalis having the highest numbers of individuals with diabetes. Charles (1907) expressed that the Calcutta climate played a major part in the appearance of diabetes:

The Marwari, in Rajputana, but comparatively little attacked; in Calcutta a very common victim. In that city he leads high finance, and thus working the machine to the utmost, attending least to its needs, receives offended Nature's punishment for errors of diet and digestion. The sick Bengali pleader, leaving his overwork and anxieties, that have broken every law for the efficiency of assimilation, goes to the hills. Besting in a better climate his overheated machinery again performs its functions - the symptoms of indigestion are ameliorated, and considerable improvement follows. The Calcutta climate and hustle even overthrows the Chinaman, here furnishing the exception to his so-called immunity from diabetes. (Charles 1907, 1051).

It is worth noting that Charles (1907) defines diabetes to be a condition of 'constant glycosuria' or sugar in the urine and indigestion, caused by 'malassimilation of food' (1051). In the quote above, malassimilation is attributed to two reasons – the

tropical climate as well as the intensity of work in places such as Calcutta, which 'overthrows' even those who are supposedly immune from diabetes. Crucially, in a later part of the article, Charles (1907) adopted the racial language of his time in his discussion of diabetes. He asserts that compared to the other groups in British India, the Bengalis belong to a special 'Aryan type' which is ethnologically distinct from other populations in India:

The Bengali himself has his definite peculiarities, and is in India a special Aryan type. In order to keep pace with the advance in Western thought and in the general progress in social matters due thereto, he has altered his former habits to a dangerous extent, and, by so doing, has exposed his constitution to influences with which heretofore it was unfamiliar. In other days his tastes were simple, his wants few, and his ambitions limited. Now, amongst this people, wise in sophistry, of intellect the best, possessing many of the weaknesses of the ancient Athenians, the new leaven is working, and hence have arisen novel desires and fresh aspirations. Here we have hard and strenuous efforts to secure a livelihood or obtain honour, with the political dreams and the mental worry following on unsatisfied ambition. These have a mischievous effect on the health of the young Bengali, who, however keen may be his brain, however persevering in intellectual toil, has not by Nature been blessed with a physique to bear the strain which the altered conditions of life impose upon him. (Charles 1907, 1052).

The term *Aryan* was used by Arthur De Gobineau (1853) to describe an intellectually superior racial group in his model of racial hierarchy. While the Bengalis, according to Charles (1907), are seen as approximating the Aryan race in terms of

intellectual abilities as seen in their embrace of 'Western thought', they have not been endowed with the requisite bodily constitution to attain these higher levels. This was one of the reasons for why diabetes presented in higher numbers among Bengalis – their bodies simply cannot cope with the level of 'civilization' that has been brought to them. The language of civilization and bodily constitution which formed the racial ideology of the time also came to light in another commentary in the British Medical Journal published in 1908. This time, the discussion centered around the rarity of diabetes among the Chinese.

The author of the correspondence, Robert Saundby (1908) explained that while diabetes was indeed rare in China itself, physicians elsewhere have encountered Chinese patients with diabetes:

Twenty years ago, I took some trouble to ascertain the geographical and ethnographical distribution of the disease, and had to thank many correspondents for the trouble they took for me: but no one sent me such full details as Dr. Burge, then of Shanghai, now of Bournemouth. He not only gave me his own experience, but brought the matter before the local Medical Society and elicited the fact that not one of the members had ever met with a case in a Chinaman; but a statement was forwarded to me from Singapore, made by a Chinese doctor, who said that while the disease was very rare in China, he had met with seven or eight cases in Singapore among the Chinese during fifteen years' practice. Considering the extraordinary increase in the proportion of cases of diabetes observed in civilized countries during the last twenty or thirty years, it seems to me that diabetes may be getting a common disease among the

Chinese, especially among the wealthier classes, who have adopted many of the luxurious habits of Europeans, and this view is supported by the appearance of the disease among the Chinese at Singapore, where the wealthy Chinese are Europeanized. (Saundby 1908, 117)

Saundby's assertion here is consistent with that of Charles (1907) from earlier, specifically with how the Chinese, much like the Bengalis, have been afflicted by diabetes because they have adopted European lifestyles and ways, or 'Europeanized'. These ideas on the prevalence of diabetes don't just adopt a racialized framing. Embedded within these articulations are assumptions relating to notions of civilization and biological capacity, both key constituents of the racial ideology in the early 1900s. We see in the quote by Saundby (1908), for instance, how the adoption of 'civilized' and luxurious 'lifestyles' have led to even the supposedly 'immune' Chinese developing diabetes.

The racialization of diabetes in Singapore occurred in other ways too. Aside from comparisons with the civilizational metropole and highlighting racial capacity, medical researchers in the late colonial era also dived into the phenotypical differences in diabetes. In another study published in the British Medical Journal in 1958, medical researcher Ronald Wells who was based in the General Hospital Singapore found that unlike diabetics in North America and Europe where insulin deficiency was found to be the leading reason for the onset of diabetes, there seems to be a higher proportion of diabetics who are insulin insensitive in Singapore. More importantly, Wells (1958) observed that the condition of insulin insensitivity was quite often temporary with most patients no longer requiring the administration of insulin after a few days in the case of

some, and up to 6 weeks for others. This 'temporary' state of diabetes was corroborated by other clinicians such as W.B. Waddell, who wrote a short commentary to the British Journal of Medicine in 1959 pointing out the 'remarkable' abilities of the Asian body:

It is becoming generally acknowledged that Asian diabetics frequently show amazing returns to normal blood sugar curves after a short period of tolbutamide or insulin treatment. I feel that it is worthy to note that it now appears that Europeans living in the tropics also seem to have this power of recovery from diabetes mellitus. If, therefore, this temporary diabetes with, as in this case, no obvious cause really does not occur in temperate climates, then it infers that the tropical environment either causes a temporary form of diabetes or alternatively enables recovery from classical diabetes to take place. (Waddell 1959, 1120)

The examples by Wells (1958) and Waddell (1959) illustrates how 'Asian' as a population category in medicine has emerged as salient. In both cases, Asian diabetics are described as presenting phenotypically different types of diabetes as well as having bodies that react more positively to treatment compared to North American and European populations. However, racialization through the category Asian is not only enacted through the establishment of biological difference, but also through the invocation of 'tropical' diabetes. Tropical diabetes as explained by Waddell (1959) is not just a simple case of populations in tropical regions of the globe presenting phenotypically distinct diabetes. The question of geography and 'seasoning' of Europeans in the tropics, a process that has been raised by historian Suman Seth (2018), also formed part of the medical discourse as highlighted in the Waddell (1959) quote. Prolonged habitation in the tropics allow for the development of abilities to

recover from diabetes among Europeans. Note that while the medical literature points to the remarkable acclimatization of European bodies in the tropics, the same could not be said of other Asians such as the 'Chinaman' who succumbed to the Calcutta climate and developed diabetes (Charles 1907).

There is another, less sensational way in which the racialization of diabetes occurred during the late colonial period too. In a 1959 paper published in the Annals New York Academy of Sciences by clinician Ho Yuen, who practiced at the Singapore General Hospital, it was highlighted that the incidence of diabetes was a lot higher among Indians in a population that was predominantly Chinese:

Thus, in Singapore, diabetes in children is decidedly uncommon, and the disease frequently manifests itself in middle life. The maximum incidence falls within the age group of 36 to 65 years. The sex incidence also differs from that seen in other countries, as the disease is commoner among males than females. In its distribution among the various races, the disease is commoner among Indians in a population predominantly Chinese. The majority of patients comes from the low-income group in which carbohydrates, especially in the form of rice, constitute the major part of the diet. (Yuen 1959, 918)

Yuen (1959) elaborated that in the context of Singapore, where eating good food (the author did not really explain what good food entails) is a strong part of the culture for all of the communities, it also presents a problem for diabetic management. Race is utilized differently from before here; the author still uses the racial categories derived from the colonial administration - although the purpose of the racialization is descriptive,

mainly to paint a landscape relating to the racial distribution of diabetes. The language of civilization is conspicuously missing in this particular publication but we see here the problematization of behavioral patterns that is beginning to emerge. Regardless, this does not necessarily indicate a broader shift in the discourse on diabetes.

The narrative of civilization, with its attendant assumptions regarding racial capacity and hierarchies would continue to dominate global public health discourse and animate conversations relating to diabetes in the 20th century, even assuming a new moniker – development. The coming section describes this very transition to the discourse on development and how it became a central theme in Singapore's public health imaginary. In particular, I highlight how the theory of epidemiologic transition became woven into concerns relating to postcolonial progress and Singapore's supposedly fragile existence as constructed by the political elite.

The Postcolonial Political Stakes: Independence, Multiracial Vulnerability and Development

What makes development so important in our understanding of the history of diabetes and broadly speaking, the history of Singapore? There are a few layers to this laden question. Theoretically speaking, this inquiry opens up an engagement with the scholarship on developmentalism in postcolonial Singapore (Chua 1994; Pereira 2008) by taking seriously the role of modern techniques of managing life, health and the population in the process of development; to put it simply, the political economy of postcolonial Singapore cannot be isolated from the condition of its citizen bodies. Empirically, the claim of development needs to be located within a backdrop of a

tumultuous independence, a narrative of multiracial vulnerability and a specific trajectory of economic development undertaken at the expense of democratic politics. Diabetes as an emergent concern in the postcolonial period therefore overlaps with the postcolonial political project in which the state sought to continuously highlight its policy successes in order to reinforce political capital. Lastly, analyzing political claims through the lens of disease affords us a glimpse of a historical racial formation, thereby establishing the base from which the contemporary biopolitical machinery in Singapore has been built on.

The bitter political conflict and communal violence that formed part of Singapore's independence in 1965 reflect deep seated philosophical differences in racial management between the government in Singapore and the federal government in Kuala Lumpur. Singapore first gained independence as part of Malaysia in 1963. From the beginning however, the union was precarious; while Prime Minister Tunku Abdul Rahman and the incumbent United Malays National Organization favored the political doctrine of 'ketuanan Melayu' or Malay Supremacy whereby the Malay racial group would be positioned above the other racial groups, Singapore politicians led by Lee Kuan Yew insisted on a Malaysian Malaysia where all racial groups are treated equally. It is important to note that in contrast to the population in rest of Peninsular Malaysia which is predominantly Malay, Singapore's population was made up of at least 70% Chinese, most of whom who had journeyed from Southern China made their home on the island. Instituting a doctrine of Malay supremacy would effectively strip away the political power of the majority Chinese in Singapore. The tension that grew from this

disagreement boiled over into the 1964 race riots in Singapore which in turn culminated in Singapore's expulsion from Malaysia in 1965.

Sunil Amrith (2010, 308) explains that Singapore 'founded itself upon a narrative of struggle', a vulnerable Chinese majority city state in a 'Malay Sea'. Embedded within this narrative is a notion of racial eugenics which would drive incipient biopolitical formation in postcolonial Singapore: as an isolated 'Chinese' isle, the young nation would have to defend itself geopolitically as well as culturally. For the postcolonial government, the best way to do this was to mold a disciplined and hardworking population, lest it become 'soft' and succumb to the tropical environment (Amrith 2010, 308). Lee Kuan Yew, who became Singapore's first Prime Minister and acknowledged as *the* architect of modern Singapore believed that the majority Chinese constitution of Singapore was a key component in attaining development and even racial eugenics had been discredited since the second world war, Lee made no attempt to hide his belief of its core ideas in the 60s (Barr 1999). Recall that for Lee, being of East Asian ancestry meant having the 'X factor' in development, especially in a tropical environment which he believed (ironically in true orientalist form) inhibits civilizational advancement (Barr 1999, 145). Suffice it to say that the cultural notion of Chinese superiority amid the 'Malay Sea' would raise the stakes for the postcolonial development project in Singapore.

There is also the issue of economic policy path undertaken by the political elite upon achieving independence. After a period of economic and political uncertainty circa 1965 in which Singapore was ejected from Malaysia, the government instituted a development policy that was quite different from the other states in the region. Where

Japan, South Korea and Taiwan cultivated domestic capitalists to spark economic growth, Singapore took the road less traveled, opening up the economy to multinational corporations while maintaining a high degree of planning and control over the working population (Pereira 2008). The extent of population control manifests clearly in the institution of a forced savings mechanism that the government was able to access for infrastructural projects, as well as the 'nationalizing' of labor unions, ergo depoliticizing a potent bargaining mechanism for the working class (Pereira 2008, 1192; see also Huff 1995, 740). By 1977, work stoppages resulting from labor dispute was effectively eliminated (Huff 1995). This strategy of low-cost production base for MNCs paid off, with Singapore's economy growing at a rate of 15% per annum between 1965 and 1980.

This mode of economic developmentalism is also accompanied by a 'top down' style of governance which figures the economy as a technical problem 'to be solved by experts', thereby excluding the political participation of the electorate who are figured as lay individuals who do not possess the 'requisite knowledge to be trusted with making informed decisions' (Chua 1994, 658). Any attempt to subvert this paternalistic arrangement would be met with legal ramifications; an attack on economic policy constitutes an attack on politics, and the Societies Act which delimits political activity and critique strictly to political parties means that any kind of 'non-expert' intervention aimed at the economy would be sanctioned. More importantly however, this era of development reflected a Hobbesian compact between the state and citizen body. The legitimacy of the government hinges on the promise of continued economic growth and as long as this condition is met, the citizen body accepts the anti-democratic practices and political dominance of the People's Action Party (Chua 1994). So how does

diabetes fit in this wider story of development? To answer this, we need to examine a key scientific theory that gained traction in 1971 - epidemiologic transition. As the idea of epidemiologic transition grew in stature within the global development and health discourse, it enabled the recognition of diabetes as an important disease in Singapore's postcolonial public health discourse.

Rostow meets Omran: Epidemiologic Transition and its Many Faces

Economic metrics formed just one part of the state citizen compact and developmental imaginary in postcolonial Singapore. The delivery of development was to be accompanied by a host of 'issues' that mainly affected 'developed' nations vis a vis underdeveloped nations such as Singapore. In a sense, the anticipation of problems, especially health problems, followed closely, the teleological understanding of development derived from the then wildly popular staged model of growth put forth by influential American Economist Walt Rostow in 1959. Under Rostow's model of growth, nations follow a path beginning from 'traditional' society with 'limited production functions' (Rostow 1959, 4) towards attaining American levels of high mass consumption. The Rostowian model served as an important ideological justification for the United States' pursuit of global hegemony but what is also notable here is that this idea of linear progress which occupied the cold war zeitgeist would make its way into the thinking of Singapore's political elite, and find a cousin in the form of the theory of epidemiologic transition.

The theory of epidemiologic transition published by Abdel Omran, an Egyptian American epidemiologist based in George Washington University represents a

systematic attempt to understand 'changing disease patterns that have accompanied modernization in most Western countries' and also 'tenacious population problems of less-developed countries' (Omran 1971, 732). Omran (1971) also explained that studying epidemiological history and trajectory improves understanding of population health, therefore enabling better designed disease control programs that would contribute to 'socio economic development' (733). Omran's (1971) pattern of disease transition can be distilled into the following three stages: 1) Pestilence and famine 2) Receding Pandemics and 3) Degenerative and Man-made diseases. Omran (1971) too adopts Rostow's (1959) linear, staged perspective to describe the historical patterns of health in human populations. Crucially, these stages are tied closely to the language of modernity and development; terms like 'developed', 'modern' and the 'West' are used to describe countries deemed to be ahead in the trajectory of progress. Less 'modern' nations grapple with higher levels of infectious diseases contributing to overall population mortality whereas developed nations deal with a higher proportion of non-communicable, degenerative, or what is better known today as chronic diseases.

Critiques of the epidemiologic transition model are wide ranging. Perhaps most notable of all in the broad spectrum of critiques are the ones that charge the model as not being necessarily representative of the complex realities on the ground (see Janes 1999; Hill et al. 2007; Agyei-Mensah and Aikins 2010; Carolina and Gustavo 2003). Sticking to this model then, despite its lack of congruence with what is actually happening on the ground has very real consequences. In cases where epidemiologic transition informs public health policy, the state may delay steps needed to tackle the onset of chronic diseases in the population or vice versa. Despite the dangers as

Carolina and Gustavo (2003) observed, the model of epidemiologic transition continues to be used. Why was this? A possible answer was proposed by Vaughan and Adjaye-Gbewonyo (2021), who argue that the model is attractive to those seeking to distinguish themselves from previous racial frames on disease because it emphasizes ‘comparability and commensurability’ (4) between populations (as opposed to racial difference i.e. Africans are more susceptible to malaria compared to Caucasians for biological reasons). Yet as Vaughan and Adjaye-Gbewonyo (2021) explains, even this was insufficient to repel racist thinking as the transition model became entangled with racist conceptions of staged development. The authors point out to how ‘urbanizing’ Africans were especially susceptible to being pathologized in the epidemiologic transition account, with ideas on ‘maladjustment’ of rural Africans to modern life serving as an explanation for the growth of certain disease patterns (Vaughan and Adjaye-Gbewonyo 2021, 5).

If this sounds familiar, that is because this vocabulary of ‘maladjustment’ has essentially been recycled since its earlier appearance. Recall the paper by Charles (1907) regarding the increased incidence of diabetes among Bengalis in Calcutta. There too, Charles (1907) invoked the idea of maladjustment to ‘Western’ life as being the key reason for the plight of the Bengalis. The pathologizing of racialized bodies as well as the blaming of cultural practices among populations, what Vaughan and Adjaye-Gbewonyo (2021, 11) terms ‘lifestyle drift’ tends to individualize the rise of chronic diseases, blaming biological constitution or problematic behaviors as contributing factors instead of examining the political, economic and environmental factors. Focusing on the problems of development under this broader framework of epidemiologic

transition therefore allows for the depoliticizing of health issues in postcolonial contexts and ‘developing’ nations in the global south. A model which treats the onset of noncommunicable diseases as natural tends to also obscure crucial variables that animate the growth of chronic diseases in the population.

Recalibrating our lens to focus on diabetes, specifically the case of postwar South Africa, Vaughan (2021) argues that the sugar industry and its role in engendering a nutrition transition between 1980 and 2000 also needs to be recognized. Vaughan (2021) highlights the struggle between researchers such as George D. Campbell who became the main driver of the food environment (specifically the explosion of refined sugar in South African diets) thesis in explaining the rise of diabetes among the various racial populations in South Africa, and the sugar industry which grew steadily with the support of the apartheid government in the postwar years. Campbell, also sought to discredit the theory of racialized disease – where certain groups were deemed as being naturally susceptible to diabetes - arguing instead that ‘environmental factors have swamped those due to heredity’ (Vaughan 2021, 167). Campbell was convinced that ‘the most likely causative factor was the urban diet of refined carbohydrates (white bread), sugar and sweetened foods’ (ibid, 169).

Vaughan’s (2021) research points to the tension within public health research that needs to be located within the broader history of development, race and health. The association between development and race renders the ‘environment’ invisible in analyses of population health. Environment here is not exclusive to food environment, but can also be extended to global economic trends such as trade liberalization policies, political instability or quite simply the sheer refusal of development aid agencies to

acknowledge the presence of chronic diseases such as diabetes in ‘underdeveloped’ contexts (see Agyei-Mensah and Aikins’ 2010; Moran-Thomas 2021). Given the deep ideological roots that form the foundation of the epidemiologic landscape in developing contexts then, it is no wonder that the model of transition and its depoliticizing implications retains a certain charm in public health language. Yet there are other ways in which epidemiologic transition has been mobilized, that doesn’t necessarily constrain nations within that category of undeveloped. The coming section will discuss how politicians in postcolonial Singapore utilized the model of epidemiologic transition to make certain political claims that justify its policies.

Developing Diabetes in Postcolonial Singapore

In the previous section, I touched on how developing nations and their racialized populations are viewed from the outside. It is also important to consider how the view from the outside – which very often take the form of grand universal models such as epidemiologic transition - can shape the reaction of young nations seeking to invent a stable narrative for their identities. Within the context of Asia, Sunil Amrith (2009) describes a peculiar phenomenon where the ‘narrative of progress, enlightenment and philosophy’ driven by postwar advancements in science and medicine was juxtaposed with that of the untamable ‘nature’ of post-colonial Asia, with its ‘overcrowding and over-population in a tropical environment which needed ‘ceaseless disinfection’’ (93)⁶.

⁶ This characterization of Asia was based on a rudimentary mode of epidemiologic zoning, where disease ecology and the tropical environment constituted important factors. A WHO official in Amrith’s (2009) account expressed this zone to include Indonesia, Southeast Asia and Central Asia (85). Interestingly, Amrith (2009) asserts that the leaders in postcolonial states too shared this view of ‘Asia’ as sharing certain

The public health policy that emerged after independence in Singapore was oriented to eradicate these very issues – an aggressive rehousing policy, the improvement of sanitation and hygiene through the rounding up of cattle and the introduction of expertise such as sanitation engineers, the introduction of air-conditioning as a way to overcome energy sapping tropical heat, the management of itinerant hawkers who are deemed as disease vectors, the implementation of public health education and the expansion of the medical sector. To say that the postcolonial government in Singapore participated in the development programs from the 60s through the 1980s would be an understatement. It wholeheartedly embraced the development discourse and made the island nation an exemplar of development in Asia. Parallel progress could also be seen in Singapore's fervent adoption of global technoscientific standards for medicine and public health, particularly in the case of diabetes. The trajectory of development and universalization continued apace as Singapore steadily handled its infectious diseases and began to turn its focus towards chronic diseases.

Out of the Tropics, Diabetes

Where existing historical work on colonial medicine regularly point to the importance of *place* (ie. the Asian continent and/or the tropics) as a source of afflictions (see Manderson 1999, Seth 2018 and Amrith 2014), focusing on diabetes challenges

traits, but they also expressed Asia's poor health situation to be a consequence of poverty more than anything else. This was articulated by Jawaharlal Nehru at the anti-colonial Asian Relations Conference in 1947, where he attributed the persistently high mortality and morbidity across Asia to material deprivation. Essentially, people were not well because they were not consuming enough nutrition (Amrith 2009, 85).

this narrative. With diabetes, disease becomes unmoored from place and become more closely associated with the temporal dimension - diabetes and the state of being diabetic becomes more closely associated with modernity and progress, both understood in simplistic teleological terms. This progression is not necessarily an even experience, with certain ethnic populations bearing more of the impact of development than others. Recall the examples of the Bengali and Chinese bodies, which are seemingly incompatible with the modern European lifestyle, leading to higher incidence of diabetes.

I wish to return to the article by physician Ho Yuen (1959), this time, to highlight a different portion of the findings. While the author explains that the disease was most common among Indians in the majority Chinese population, he also lamented the lack of a centralized venue or a specialist clinic to treat diabetes in Singapore. The reason behind this could quite simply be that the prevalence of diabetes in the population was not high enough to warrant a specialist center, although there was no evidence of there being a systematic attempt (screening or statistical survey for instance) to determine the prevalence of the disease. For diabetes at least, Yuen (1959) notes that the cases of diabetics were identified not because of any clear diabetes symptoms such as sugar in the urine, but because patients *happened* to present symptoms such as frequent urination and thirst when seeing the doctor. In other words, the discovery of diabetes in patients was accidental and limited to the clinic. But it is also quite likely that the 'tropical medicine' oriented system in colonial Malaya was more focused on infectious diseases as a way to protect European colonial administrators and their economic interests, thereby rendering diseases such as diabetes invisible (Manderson 1999).

Infectious diseases were also more visible in the broader disease ecology in the colonial system because attending to 'tropical' diseases allowed for the ordering of space and the control of populations as a way of managing the spread of infections while conveniently ignoring the medical and social implications of an extractive and highly unequal system of colonial capitalism; rapid urbanization, unaccompanied by the development of a proper sanitation system as well as overcrowding, led to a higher incidence of malaria and cholera for instance (Manderson 1999). In a way, the kind of social welfare (post 1942 Beveridge Plan) approach which formed the foundation of public health in British Malaya served to legitimize colonial presence (Manderson 1987). This focus on the spatial management and control of populations as a way to tackle diseases of the tropics would continue well into Singapore's early independence period. Clancey (2018) argues that the Singapore government fashioned itself as a 'landlord state' with the primary objective of developing infrastructure such as housing and sanitation in order to reduce the incidence of communicable diseases:

...a ban on street hawking—selling food on the street from carts— the institution of stiff fines for littering and spitting, the near-total elimination of farms and farm-animals, a war against insect vectors, and the (very late) banning of chewing gum, among many other measures (Clancey 2018, 215).

As a landlord state, postcolonial governance in Singapore focused on infrastructure, rather than merely 'instruction and punishment' (216). The landlord state exercises its power spatially and technically, able to place and displace while setting 'rules for habitation' (216). TB and other contagious diseases were believed to have a spatial origin and the solution was thus to re-order space' (219). In the 1960s then,

government policy gave rise to an understanding of a disease ecology that comprised predominantly infectious diseases. At the launch of the Singapore Cancer Society in 1964, then Minister for Health Yong Nyuk Lin cautioned that even as Singapore has 'emerged from the dark past to become involved with "diseases of civilization"' (Singapore Government Press Statement December 1964, 2), a high degree of public health vigilance was still needed to avoid potential outbreaks of tropical diseases such as tuberculosis, malaria, typhoid fever, cholera, plague, smallpox, beri-beri, diphtheria and leprosy (ibid).

Between the immediate postcolonial period of 1965 up till 1970, politicians continued to adopt this cautiously optimistic attitude. On the one hand, there was recognition of the progress that Singapore was making in managing infectious diseases. Yet there was also an unmistakable awareness of the potential for outbreaks, even as rehousing efforts continued, and modern antibiotics and vaccines such as the BCG vaccine were being rolled out to the population. A cholera outbreak in 1963 led to 27 confirmed cases and the emergency inoculation of 2 million people. As a result, the government introduced a 4-month spring cleansing campaign in 1964 to rid the excessive amounts of refuse and litter around the streets. 1964 saw the introduction of the cattle ordinance and the Special Cattle Disposal Squad to contain cattle within designated areas and more importantly keep cattle dung which attracted flies, from many areas of the city (Singapore Government Press Statement December 1967).

Even with these new measures in place, a typhoid outbreak occurred in 1965. This was concentrated in Chun Cheng High School, leading the Minister for Health to

again reiterate the importance of hygiene and sanitation in limiting the spread of infectious diseases:

Typhoid disease is generally spread by 'carriers' i.e. people who harbor the typhoid bacteria in their body system, usually after having 'recovered' from typhoid fever previously, and intermittently passing out this bacteria in their excreta. Should the personal hygiene of such 'carriers' be low and they also live in houses without the benefits of modern sanitation, the chances of typhoid bacterial contamination of food and drink and subsequently spread of typhoid are always present. (Singapore Government Press Statement April 1965).

The issue, as described in the quote above, is not just 'carriers' who do not practice good hygiene. It is also the fact that the sanitation infrastructure is inadequate, which allows for the increased chances of the spread of bacteria. In the same press release, Minister for Health Yong Nyuk Lin also stressed that about a third of the Singapore population have yet to be relocated into new housing with high standards of sanitation. Furthermore, the widespread practice of street hawking selling 'foodstuffs in raw state, etc. and aggravated by standards of public cleansing which are not as high as it should be' continued to pose a problem to the containment of a food and water borne disease such as Typhoid (Singapore Government Press Statement April 1965). In 1966, a new public health measure, the hawker code, was introduced. The law sought to grant hawker licenses as well as regulate hawker activities to ensure that hygiene standards were being met (Singapore Government Press Statement December 1967).

The drive towards creating clean space as a means of maintaining the spread of infectious diseases and public health continued in the form of the 'Keep Singapore Clean' campaign in 1968 as a new Minister for Health, Chua Sian Chin emphasized the importance of cleanliness in a tropical environment:

By virtue of its location in the tropics, just north of the Equator, Singapore is subject to high annual rainfall, high humidity and high temperature these give ideal ecological conditions for a rapid propagation of disease-bearing insects and for the growth of bacteria. This in turn causes rapid decay and decomposition of waste matter with consequent serious pollution of the environment. (Singapore Government Press Statement August 1968)

The cleanliness drive was complemented by the passing of Environmental Public Health Act of 1968 which would allow patrolling field officers to impose a hefty fine on people who litter and even evict tenants who litter out of their high-rise apartments (Ministry of National Development Press Release April 1969).

Historian Gregory Clancey (2018) pointed out that this fixation with order and space as a public health strategy withered as early as the 1960s as rehousing the population became more closely associated with a developmental narrative – '... poverty-relief, wealth-sharing, technology, economics, politics, etc.' (219). Health, he added was 'never fully abandoned as a justification for re-housing, it was just no longer necessary for policy implementation' (ibid). In the first place, Clancey (2018) observed that the role of the health ministry as provider of public health at this time had been thoroughly eclipsed by the Ministry of National Development as it was the latter that was

more closely associated with the mass rehousing effort in postcolonial Singapore⁷. Furthermore, the health ministry had inherited a colonial framework for public health that had helped accomplish infectious disease management objectives (see also Manderson 1987) fairly quickly whereas the rehousing project was still in its infancy when the British left (Clancey 2018, 220).

The question that arises from this set of circumstances would then be, how did the health ministry make itself important again amid the challenges faced in the landscape of postcolonial nation building? Clancey (2018) suggests that the Ministry of Health sought to build up its influence and capacity through the launching of aggressive cleanliness campaigns in the 60s, a move which aligned with the National Development agenda. While this may be true, it does not capture the longer-term strategy undertaken by the Ministry of Health to retain its political salience. The importance of the Ministry of Health, I argue would be rekindled through a full embrace of the narrative of epidemiologic transition as well as the highlighting of chronic diseases that came with postcolonial development. In other words, the health ministry reinvented itself by tapping into the rich vein of development rhetoric that had squeezed it out initially.

⁷ The Health Ministry was arguably among the least successful of government bureaucracies in co-opting its natural 'clients', in this case physicians, who would account for some of the most vocal critics of the regime among civil society groups. Some of its campaigns also revealed the limits of public coercion. By contrast, the National Development Ministry and its (technically autonomous) Housing Board were more successful in marginalising local architects and planners who sought to challenge or influence the infrastructure-building mission (Clancey, 2007)." (217)

The Big 5 and Developing Diabetes

The turn away from infectious disease was emphasized in an address to physicians and medical researchers affiliated with the Singapore Medical Association in 1968:

Singapore, for quite some time now has been reasonably successful in the control of many communicable and infectious diseases which, however, are still plaguing the health authorities of most other developing countries. On our part, we find ourselves having to deal with medical and health problems which are prevalent in richer and more advanced countries, but unfortunately without the benefit of their larger financial resources. (Singapore Government Press Statement March 1968)

Here, minister for health Yong Nyuk Lin lauded the young nation's success in controlling communicable and infectious diseases that are still affecting 'developing nations', urging the audience to prepare themselves to face medical issues that are typical of developed countries. The demarcation between developing and advanced is made clear here and Singapore's population disease profile is described as one which was shifting into the latter. Economically Singapore may not be 'developed' but the minister was certainly not shy in declaring the nation's developed status from an epidemiologic perspective.

In a later speech, this time to an international audience during the 22nd World Health Assembly held in Boston, then health minister Chua Sian Chin painted a picture of Singapore being a

...tiny speck of tropical island, less than 225 square miles in area, yet the scourges of tropical diseases and the major epidemic infections no longer decimate the population. (Singapore Government Press Statement July 1969)

Consistent with the cold war narrative of development popularized by Walt Rostow, the minister made an explicit reference to staged development and its relationship to disease:

Now we stand at a transitional phase in our development. Ahead, we dimly see the new challenges. The virus diseases, the cancers, yet unconquered; constitutional diseases such as diabetes, acquired heart diseases, the degenerative disease and others. Certain countries are already ahead and in the fray; others will follow. Our position along the path is, more than anything else, determined as much by the stage of our economic development. The developed nations having an advanced medical technology, and sophisticated medical services; while the less developed countries lag behind in various stages of development. (Singapore Government Press Statement July 1969)

Key in this particular pronouncement is the acknowledgement of a set trajectory and how a nation's epidemiologic landscape is very much tied to economic development. As unremarkable as this statement may seem today, it is important to recognize the minister's prescience on the matter given that the theory of epidemiologic transition would only be published by Abdel Omran (1971) 2 years later. Regardless, if we take into account the 'stage' in which this pronouncement was made, it would be reasonable to think of it as an announcement of Singapore's entrance into the world of

the 'developed', separate from the other still developing countries in the 'tropics'. Regardless, this transition, as the minister suggests, was yet to be completed as Singapore continued to deal with infectious diseases and this transition period would continue up till the late 1970s⁸.

It was only in 1979 that the National Health Campaign would highlight 5 chronic diseases – heart attack, cancer, diabetes, high blood pressures and mental illness – as increasingly important diseases in the population. The reasons for the increasing prevalence of these diseases were growing 'stresses and strains of modern-day living'. The minister for defense, who was a strange choice to deliver the campaign launch speech, described the objective of the health campaign as follows:

Its main aim is to get our people to learn more about those illnesses which result from the stresses and strains of modern-day living. Some are due to over-eating, eating wrong foods, smoking, and lack of physical exercise. With rising standards of living, the life-styles of the people will change. Where physical health is concerned the change is not for the better. Many illnesses associated with the stresses and strains of modern living are becoming more common. (Singapore Government Press Release September 1979)

Where the previous quotes described Singapore as being developed but with caveats, this particular speech was unequivocal in declaring Singapore's developed and modern status. In another launch for the same campaign, this time presided by the secretary general of the National Trade Union Congress Singapore, the five diseases

⁸ In 1976, the National Health Campaign to combat infectious disease was launched (Singapore Government Press Statement September 1976).

were again highlighted and Singapore's transition to a modern, urbanized status was reiterated:

Statistics show that diseases such as heart attack, cerebral strokes, hypertension, diabetes mellitus and mental illness are on the increase in Singapore. This is in part attributable to the stresses and strains encountered in our increasingly urbanized and industrialized society. Yet at the same time, it maybe the sedentary over-indulgent lifestyle enjoyed by many which is the real culprit. In our small island state where our most valuable resources are our people, we must ensure that we have a healthy population who can continue to give off their best. It is therefore important that special efforts be made to increase the awareness amongst our citizens of those major diseases which threaten our own health and the health of the nation. In this connection, the National Health Campaign currently organized by the Ministry of Health has a vital role to play. (Singapore Government Press Release September 1979)

The tone here is similar to the quote before: Singapore was essentially a victim of its own success and ignoring the creeping incidence of these diseases will lead to a decline in quality of 'our most valuable resources' - the people who form the labor force (Singapore Government Press Release September 1979). While the postcolonial state articulates progress in public discourse, it also posed a new form of vulnerability, building on the narrative of a fraught independence for the nascent multiracial republic described earlier.

The health campaigns of the coming years saw a flurry of similar warnings that described the importance of adjusting to the stresses of modern life to ward off disease. In 1980 for instance, the senior minister of state for education, Tony Tan warned of the crippling and long-term effects of chronic diseases such as heart attack, high blood pressure and diabetes, on the individual and broader society:

In Singapore today we enjoy a good standard of living. There is full employment, ample public housing and many recreational activities. However, good living also has its dangers. Some people are indulging in lifestyles which are harmful to their health. As a result, diseases like heart attack, high blood pressure and diabetes are increasing. All these diseases are a cause of concern as they rank among the major causes of death in Singapore. It is not only the individual who suffers but also his family and relatives. People who are hospitalized for long periods or who require medical treatment throughout their lives also impose substantial economic cost to society. (Singapore Government Press Release January 1980)

The minister began by highlighting Singapore's material progress, proceeding to then remind Singaporeans that this 'good living' that comes with progress is a double-edged sword. It can lead to Singaporeans adopting behaviors that are detrimental to individual health but more importantly, it imposes stress to their family as well as society. In 1984, the Parliamentary Secretary for Health and Culture, Wan Zooohri, reiterated the narrative of disease progression in Singapore, explaining that the country is well past having to deal with communicable or infectious diseases:

During the last two decades, we, in Singapore, have seen considerable improvement in the quality of our living environment. Our living standards have risen and we have presently a high rate of literacy. This, together with the improvement in the health services have resulted in significant changes in the pattern of ill health and disease. In the 1940s and 50s, communicable or infectious diseases were the main cause of illness and death. Many of these diseases have now come under control. In fact, some of them like diphtheria and poliomyelitis have been eradicated. The new pattern of diseases which has surfaced is chronic degenerative conditions like diabetes, heart attacks, strokes and cancers. (Singapore Government Press Release September 1984)

By this time, the status of Singapore as developed is beyond question. As the previous quote asserts, 'living standards have risen' and the infectious diseases that burden developing nations 'have now come under control'. Yet this state of developed-ness also means having to contend with chronic conditions such as diabetes, heart attacks, strokes and cancers, which as the series of quotes suggest, is a consequence of poor health behavior (Singapore Government Press Release September 1984). Where public health intervention for infectious disease largely took the form of aggressive state control and the management of space and environment, the burden of managing chronic diseases in the late 70s and 80s has shifted to individuals and the population, reflecting a new approach to public health and biopolitics that seeks to discipline bodies through shaping individual behavior.

Chronic diseases in the form of the big 5 - heart attack, cancer, diabetes, high blood pressures and mental illness - become constructed in the public health narrative

circa 1980 as a set of afflictions that mainly affect developed countries and populations. During this time, diabetes was not yet *the* face of chronic disease in a developed Singapore. As described earlier, it belonged to a package of chronic diseases that was one of the main contributors to mortality (alongside heart disease and cancer) as well as lasting implications on bodily functions such as the loss of limbs, kidney failure and dependency on dialysis machines, all of which were recognized as healthcare and economic burdens (Singapore Government Press Release March 1986). Diabetes would continue to compete for prominence in the public health discursive space throughout the 90s. Yet between the 80s and the early 90s, key personnel in Singapore's Ministry of Health were already beginning to push for the recognition of diabetes as the most pressing public health issue.

In an oral history interview, Dr Shanta Christina Emmanuel, a trained physician and the Director of the Research and Evaluation in the Ministry of Health between 1986 and 1997 explained that as communicable diseases were brought under control in the population, at that time she held the belief, based on her knowledge of the history of the Indian ethnic population in Singapore, that diabetes would emerge as the main public health threat (Emmanuel January 2022). Similar to prevailing public health narratives, Dr Emmanuel attributed this to an increasingly sedentary lifestyle and the fact that eating was basically a Singaporean 'past time'. However, Dr Emmanuel was well aware that the health ministry did not understand enough about diabetes in the Singapore population. This led her to push for population level epidemiological survey, in particular the 1992 National Health Survey which the ministry then established as the baseline population survey (Commencement of First National Health Survey September 1992),

to make legible the extent of the diabetes problem along with other population health issues (Emmanuel January 2020).

It is important to note here that while the growing significance of diabetes between the 60s and the 90s was inextricably linked to narratives of development and progress in postcolonial Singapore, diabetes as a disease entity had been circulating in the clinical and research world long before it appeared as part of the big 5 chronic diseases in 1979. However, the status of diabetes as a disease of concern would not have been possible without a concurrent development of a technoscientific understanding that would grant it legibility in the public health discourse. This is where the development of certain expertise and infrastructure in the Singapore health system, including Dr Emmanuel's push to create a world class epidemiological survey instrument in Singapore would come into play. These efforts are not necessarily visible to the public eye, especially since they occur in the context of closed institutions such as hospitals and universities. In the next section, I will try to elucidate how diabetes as an emergent public health problem, developed in the background.

From Global to Local Concerns

The year 1965 saw one of the first of what would become a series of efforts on the part of the World Health Organization (WHO) to highlight diabetes, specifically type 2 diabetes, as an emergent global public health concern. The push can be traced to efforts of the International Diabetes Foundation (IDF) and in particular Drs Root⁹ and

⁹ Howard Root was part of the Joslin Clinic in Boston Massachusetts, which also hosted Leo Krall, one of the authors for the seminal diabetes survey study 'Diabetes in a New

Klimt, both of whom were physicians based in the United States. In 1961, they petitioned the WHO to acknowledge the growing prevalence of diabetes and to formulate a program which would encourage the 'exchange of scientific information', the 'standardization of definition used in the field of diabetes' and the development of 'studies relating to the prevalence and incidence, natural history and nutritional problems' relating to diabetes mellitus (WHO December 1961). The WHO responded, albeit belatedly, by putting together an expert committee in November 1964. A year later, the very same year that Singapore attained independence, the WHO expert committee published a report on Diabetes Mellitus.

The 1965 WHO diabetes report provided greater clarity on diabetes prevalence based on a meta-analysis of epidemiological surveys from countries all over the world. More importantly, the authors raised the alarm when they described diabetes as being an invisible threat, especially considering that population screening conducted around the world between 1947-1964 uncovered a high proportion of undetected cases among all socioeconomic classes (Butterfield et al. 1965). The authors called for a population screening using universal standardized procedures, measurements and thresholds¹⁰. The report also encouraged a movement away from diagnosing diabetes by measuring urine sugar levels or glycosuria which although less expensive than blood sugar, is less sensitive and yields higher false positives (Butterfield et al. 1965, 21). Population

England Town' (Wilkerson and Krall 1947) which would be replicated in many other contexts (see Krosnick 2002).

¹⁰ After a 12 hour fast overnight, a fasting sample is drawn. The patient is then given a glucose load and another sample is drawn after 2 hours. A 2-hour sample from someone under 45 reaching or exceeding 130mg/100ml (capillary) or 125mg/100ml (venous) establishes the presence of diabetes.

glucose tolerance test or GTT screenings would also allow for the detection of new but especially latent and asymptomatic diabetes¹¹ in countries not included in the metanalysis of the studies. In short, the publication sought to advance a form of diabetes diagnostics through specific biomedical testing methods as opposed to relying on clinical symptomology (thirst, fatigue, sugar in urine) that are deemed as less accurate indicators of hyperglycemia and are therefore less effective in preempting and preventing diabetes related complications.

The WHO publication represents an authoritative guide to diabetes, pushing for countries outside of those examined in its initial survey to embark on systematic epidemiological studies based on its established standards as a form of case-finding mission, to add more data points and improve the understanding and management of diabetes. What is also interesting in the paper, aside from its commitment to diabetes as a global health phenomenon, was the emphasis on the potential human rights violations in the form of discrimination against diabetics in the employment and insurance sectors. Eugenics too makes an appearance, with the committee recommending that 'on genetic grounds' diabetics should be counselled against marrying other diabetics and if they do decide to do so, they should be discouraged from having children owing to the hereditary nature of the disease (Diabetes Mellitus: Report of a WHO Expert Committee 1965, 15). These aspects of global health, as I argue, would manifest as local health

¹¹ Latent diabetes, according the WHO text, is the condition where 1) a person whose GTT has produced a normal result but who is known to have been diabetic according to the GTT at some time during pregnancy, during infection, when under some other stress or, when obese or 2) a person who has abnormal blood-glucose responses (similar to those found in diabetes mellitus) to provocative tests, such as the cortisone-augmented GTT. Asymptomatic diabetes is defined as a person with a diabetic response to the GTT whose fasting true blood sugar is below or above 130mg/100ml (capillary) or 125mg/100ml (venous) (ibid, 8).

concerns in Singapore as physicians and medical researchers sought to ‘develop’ diabetes in a way that adheres to the aforementioned standards, thereby establishing Singapore as a node in the global health network. In this broad project, no individual is as influential as Dr Cheah Jin Seng.

As the public health messaging transitioned from communicable diseases to chronic degenerative disease between from after independence in 1965 to 1980, Dr Cheah Jin Seng, who graduated from the School of Medicine at the National University of Singapore in 1963 (Toh May 2022) and a pioneer in the field of endocrinology in Singapore, was involved in various studies that evaluated treatment methods from the ‘West’ (see Cheah and Tan 1970)¹². However, it was his epidemiological surveys that would initiate a research program on diabetes based in Singapore. Beginning in 1971, Cheah, along with colleagues based in Singapore General Hospital examined the prevalence of glycosuria, which is indicative of kidney issues and also a key symptom of diabetes mellitus (Cheah, Tan and Wong 1971). The study used both urine tests and then followed up with a GTT test per the recommendation of the previous WHO document. Granted this was not a large representative survey of the population, since the test was only performed on young men conscripted for national service. The study

¹² Note that in the 60s and 70s, research suggests that diabetes treatment in Malaya (which Singapore was a part of) mainly drew upon traditional, non-biomedical epistemologies such as Chinese traditional medicine which associated the presence of sugar in urine with ‘heat’ in the body (Soong 1971, 310). This required the use of herbs and certain types of pungent foods as remedy. The use of oral diabetics such as chlorpropamide and tolbutamide (see Ho 1959) to treat diabetes existed at this time but Cheah & Tan (1970) pushed for new forms of treatment by organizing a clinical trial for diabetics in Singapore using Glycodiazine (Lycanol), a more effective blood sugar lowering agent.

found that the most common cause of glycosuria is renal glycosuria¹³, which is highest among Malays at 0.36% followed by Chinese and Indians. Overall, the author concluded that the prevalence of glycosuria is very low when compared to the prevalence of glycosuria elsewhere. The authors also added that following the WHO standards for diagnosing diabetes, only 2 out of the 114 cases qualified, which would yield a prevalence of 0.7 per 10,000, which is considerably lower compared to studies from other countries (Cheah, Tan and Wong 1971).

It is important to note here that the authors chose to frame the data based on the main racial groups in Singapore – Chinese, Malay, Indian and Eurasians – despite there being no recommendation for this in the 1965 WHO publication¹⁴. Cheah, Tan and Wong (1971) referenced two other studies that also organized their findings on glycosuria or diabetes based on race. The first one published by West and Kalbfleish (1966) showed that the prevalence of diabetes is highest in the Chinese, followed by Indians with the lowest in Malays. The second study pointed out that the numbers for diabetes prevalence might actually be higher among the Indians in Singapore (Yuen 1959). Cheah, Tan and Wong (1971) explained that since they only managed to identify 2 people with diabetes from their very limited sample, they were not able to compare their findings with these other studies that show prevalence of diabetes in specific racial groups. Thus, despite there not being a basis for comparison, the ethnic racial aspect of diabetes was still regarded to be an important way of framing their findings.

¹³ Renal glycosuria is not a symptom of diabetes. It is defined as a rare condition where excess sugar is expelled through urine despite having normal blood sugar levels.

¹⁴ The data from the WHO document compared populations based on their socio-economic levels with no mention of race as being a salient analytic category.

A similar glycosuria study was conducted later by Cheah, Tambyah and Mitra (1972) this time with a bigger sample (n=5280) of government workers comprising different ethnicities, ages and sex. This is the first large scale study in the post-independence era focusing on the prevalence of glycosuria in the population and within racial groups. The study found 97 cases of glycosuria in the sample (prevalence rate of 1.84%) and again, GTT tests were conducted on the 97 cases to reveal the contributing causes to be renal glycosuria (39.2%), diabetes (31.9%) and alimentary glycosuria¹⁵ (24.8%). Overall, the level of diabetes prevalence was found to be 0.59% in the population sample. Again, the results were stratified according to ethnic groups with the prevalence found to be highest among Indians for ages between 17-66 (2.76%). The percentage increases even higher for those between 30-66 (6.36%). The group with the second highest prevalence across age groups are Others, which was a category replacing Eurasians from their first collaboration. With a bigger sample, the authors were able to confirm findings from previous studies that show the prevalence of diabetes to be highest among Indians.

Cheah, Tambyah and Mitra published a follow up study in 1975 with the same sample from the 1972 study but this time focusing on the 97 cases that were made to take GTT after discovery of glycosuria (Cheah, Tambyah and Mitra 1975). The GTT test standards followed with the recent 1965 WHO standard (50g glucose load for fasting blood sugar and 140mg/100ml). This study highlighted the differences in diabetes prevalence rates between the ethnic groups, drawing from findings in other studies to confirm the higher prevalence of Diabetes among Indians (9x of Chinese and 6x of

¹⁵ Alimentary glycosuria is a temporary elevation of glucose levels resulting from a high carbohydrate intake. This is then passed through the urine.

Malays) while rejecting claims from another study (West and Kalbfleisch 1966) which found the prevalence to be highest among Chinese followed by Malays and Indians. This survey also concluded that it is likely the

...diet of the Indians (high in carbohydrate and low in proteins) plays an important part. In Indians, a hereditary tendency may be coupled with a dietary factor. (West and Kalbfleisch 1966, 16)

Lastly, the authors argued that environmental factors might not play a part in the high prevalence of diabetes among Indians since 'Indians in South Africa and North America have also been noted to suffer from diabetes more frequently' (ibid). The authors concluded that among Indians, the likely explanation for the prevalence in diabetes was a combination of dietary as well as hereditary factors. Compared to the prevailing self-congratulatory tone of the public health discourse in which the increasing numbers of diabetes was tied with postcolonial development, Cheah, Tambyah and Mitra (1975) made no such suggestions. With the higher proportion of Indians in Singapore being affected by diabetes, there was no allusion to the Indians being more 'developed' or to adopt the language used by Charles (1907) on diabetes in India, more 'civilized' than the Chinese, Malays or other racial groups. If anything, the authors' findings pointed to the poor dietary practices among the Indians - consuming foods that were high in carbohydrate and fats and low in protein.

There are two things that stand out from this series of early studies. First, we can see here how local concerns cut through the implementation of global health standards. Researchers may adopt the diagnostic standards and procedures for diabetes but they

are refracted through local, postcolonial ways of 'seeing' the population (Scott 2008). The use of racial categories formed an important part of the postcolonial state administration and the extent to which Singapore society is racialized is replicated within medical research. Secondly, in using the ethnic categories, the scientists quite clearly implemented the racial logics inherited from the colonial administration. By racial logics, I mean the infusion of meaning into said categories, even if they do not necessarily correspond to the meanings constructed in colonial settings.

The categories of Chinese, Malays and Indians especially are essentially anthropological constructs that were inscribed with specific meanings meant to aid in colonial governance in Malaya (see Goh 2008, 235). However, these categories traversed administrative function and also served as an informational framework for people to understand and perceive the world (Bowker and Star 2000; Hacking 2006). For example, the Chinese were deemed as untrustworthy and industrious, the Indians docile savages fit for the plantations, and the Malay 'natives' lazy (Goh 2009). Studies have shown that these colonial era racial stereotypes continue to occupy the psyche of individuals residing in former colonies such as Singapore and Malaysia (Reddy and Gleibs 2019).

Colonial era racial categories featured prominently in Cheah's very own work, and the work that he cites (see Yuen 1959) and while there were no explicit references to colonially constructed meanings aforementioned, these very categories allowed for the infusion of similarly problematic meanings. We can see a glimpse of this racialized explanation folded into notions of ethnic diet and Indian genes, as Cheah and colleagues sought to explain the high prevalence of diabetes among Indians in their

studies. Diabetes becomes racialized and closely associated with a particular racial ethnic group, enabled by the framework of colonial racialization. The focus on Indian diet and genes will form the backbone of an emergent racial biopolitics which I will unpack in the next section.

Race, Diabetes and Genetics: Emergent Biopolitics

Cheah's prolific diabetes research continued as he wrote an authoritative, review article in the Annals of the Academy of Medicine Singapore (Cheah 1980). In it, Cheah surveys developments in diabetes research – diagnostics, treatment, etiology - and proposes a public health plan for the management of diabetes in Singapore¹⁶. He points to the increasing prevalence of diabetes in Singapore (1.99%), especially 'undetected' (newly identified) diabetics which accounted for 59.6% more than half of the positive cases in the most recent screening (Cheah et al. 1978). Cheah also raised the issue of race, immigration and lifestyle change in his explanation for why diabetes was most prevalent among Indians in Singapore¹⁷. It seems that compared to Indians in India, Indians who have migrated to other countries, including Singapore and Malaysia, were more likely to develop diabetes (Cheah 1980). This is because Indian immigrants in presumably wealthier, more developed contexts are able to consume more food than

¹⁶ Cheah also talked about the advancement on insulin treatment and new diagnostics in the form of glycated haemoglobins which makes measuring blood glucose easier. Lastly, the author also explains that the genetic factors for type 1 diabetes have been isolated to HLAs although the mature onset diabetes or type 2 is not in any way related to HLA patterns. This does not preclude genetic factors but they are yet to be discovered.

¹⁷ The prevalence of diabetes was markedly higher among Indians (6.07%) compared to the Chinese (1.55%) and Malays (2.43%) (Cheah 1980).

those in India, which coupled with their hereditary predisposition, contributes to the higher prevalence.

This idea of development and lifestyle in relation to the incidence of diabetes in the adult population is not entirely novel. Cheah (1980) cites the work of world-renowned diabetes researcher Paul Zimmet who spent quite a bit of time in the 70s studying the impact of 'Westernization' and 'social progress' on the incidence of diabetes in Pacific populations (see Zimmet 1979). Zimmet himself was fascinated by the thrifty gene hypothesis published by American geneticist James Neel back in 1962. The thrifty gene hypothesis explains that genes which predispose to diabetes were historically advantageous but they became detrimental in developed settings. This thrifty gene supposedly allows for individuals to collect fat during periods of abundance to provide for periods of food shortage.

In an environment with an abundance of food ie. the developed contexts, the thrifty gene allows for accumulation of fat as food stores in preparation for a food shortage that never comes, resulting in health problems such as diabetes (Neel 1962). Of course, the relationship between diabetes, improved access to food and the strains of modern life is not new. This was one of the explanations given by the researchers studying the increased incidence of diabetes in India's lower Bengal (Charles 1907). Supposedly, the Indians in Calcutta were struggling with the stresses of modern lifestyles, thereby causing the emergence of diseases such as diabetes. The difference

here lies in the combination of genetics *and* immigration to more developed contexts which introduces the stress of acculturation and better access to food¹⁸.

Neel's thrifty gene hypothesis was not the only way in which the understanding of diabetes was connected to genetics. At that time, the genetic basis for diabetes was still unclear. However, Cheah (1979) extrapolated from other research that type 1 or insulin dependent diabetes was found to be associated with certain Human Leukocyte Antigen or HLA types¹⁹. This finding is consistent with what Alan Hedgecoe calls the geneticization of diabetes, that is the linking of a specific condition such as type 1

¹⁸ Medical Anthropologist Cynthia Eaton (1977) argues that the growing prevalence of adult-onset diabetes or what is better known today as type 2 diabetes is often a result of stress arising from cultural change. Cultural change here encompasses a wide range of factors – new lifestyle changes such as lack of exercise, new diets, and psychological stress, all of which over stimulates the pancreatic beta cells and in effect, the production of insulin. The author also explains that the prevalence of diabetes is partly an effect of genetics, bringing up the thrifty gene hypothesis. The author describes the shifts in cultural life faced by certain groups such as the Kung!, from a hunter gatherer society to settled agricultural society which has led to a higher prevalence of diabetes occurring the latter. The paper raises a few interesting points too. The first relates to immigration, a point of concern in my examination. Much like what Cheah (1979) argues, immigrants to wealthy countries have a higher likelihood of getting diabetes because of new diets and strains of acculturation. Eaton (1977) cites a 1971 study by Lim and Khoo which shows a higher level of incidence in Chinese and Indian immigrants in the Singapore context. Of course, we know from later studies including Cheah's surveys that the prevalence of diabetes was in fact higher among Malays and Indians, with the Chinese having lower numbers.

¹⁹ Cheah (1979) did not provide a specific reference to this. However, he could have been referring to the work of British clinician and researcher Andrew Cudworth, who published on the aetiology of diabetes 1976 and another paper in 1978 where he discussed type 1 diabetes and its relationship with HLA. Hedgecoe (2002) provides an in-depth history of the establishment of a genetic basis to the different variants of diabetes mellitus.

diabetes with a specific stretch of DNA (Hedgecoe 2002, 8)²⁰. These genetic explanations for diabetes should be situated within the broader public health discourse on diabetes. Recall the 1965 WHO document on diabetes, where it was suggested that because of the hereditary nature of the disease (both type 1 and type 2 diabetes), diabetics should be discouraged from marrying other diabetics and if they still decide to do so, they should be counselled against having children (WHO 1965, 15). Such a sentiment was echoed by Singapore's Minister for Health Chua Sian Chin during an address at the 22nd World Health Assembly in Boston held in 1969. Earlier we unpacked his argument regarding the patterns of disease in relation to the stages of economic development. That wasn't the only thing that the minister said in his address:

Too long has medicine restricted its main thrust against the control of death. If we are to achieve the primary aim of this Organization, which is the improvement in the quality of life, then the control of birth is as much our concern. By keeping death at bay, we have over-populated many parts of the world; life for some is merely an existence, our ability to sustain the weak, the mentally defective may enlarge the pool of weak, the defectives may carry the seed of mankind's extinction. (Singapore Government Press Statement July 1969)

The influence of eugenics on this particular statement is very clear although not entirely surprising given that the Prime Minister of Singapore, Lee Kuan Yew, was also

²⁰ There is a bigger debate to the use of geneticization as a critical concept but essentially, Hedgecoe (2002) takes an approach grounded in molecular genetics as opposed to a critical metaphorical analysis.

a staunch believer of eugenics²¹ at that time. This idea of maintaining a good stock to ensure 'national survival' (see Amrith 2010, 308) certainly manifested in policies such as the sterilization program for low socio-economic status individuals, as well as positive eugenics policies such as the graduate mother's scheme in which highly educated women were given incentives to procreate with the belief that their children will emulate their achievements and intelligence (Palen 1986; Amrith 2010). In a small nation where the main resource is labor, eugenics figured prominently in biopolitical management. What does this mean for our understanding of diabetes in postcolonial Singapore? More importantly, what does it mean for the Indians who would be figured as genetically diabetic in the medical literature circa 60s and 70s? We need only to recall Lee Kuan Yew's brand of eugenics to understand what being framed as diabetic might have meant at that time.

Diabetes, along with the other chronic diseases may have buttressed claims of development made by politicians and public health officials but the narrative of developing diabetes - that is making diabetes a 'developed' disease while also rendering diabetic bodies visible to the state apparatus through the adoption of global technoscientific standards - reveals an internal tension. How do we explain the different levels of 'development' amongst the racial groups? Can the Indians be understood as being more developed than the other racial groups then? How do we square this with the notion of racial hierarchy held by the political elite? As developing diabetes becomes imbricated with postcolonial racial politics, Neel's hypothesis provided a way

²¹ Similar to the Health Minister, Lee also spoke of the importance of intervening through population policies to arrest the development of a society that is 'physically, intellectually and culturally anaemic' (Amrith 2010, 309).

to explain the higher prevalence of diabetes among the Indians in Singapore, one which is also very much in line with the notion of eugenics propagated by Lee Kuan Yew. It is not development per se but rather, the genetic predisposition of the Indians that led to the high prevalence of diabetes among Indians. That said, this mode of thinking is specific to this time period and as the allure of eugenics wears off (Amrith 2010), the tenor of biopolitics surrounding diabetes too changes.

Towards the end of the 80s and early 90s for instance, public health messaging on diabetes and other chronic diseases began to take on a disciplinary tone, especially as more encompassing survey instruments such as the National Health Survey in 1992, a tremendous undertaking spearheaded by Dr Emmanuel in the Ministry of Health, made diabetes legible in the social and political spheres. This is not to say that the idea of race ever escaped the consciousness of public health officials. Public health doyen Dr Emmanuel, who played an instrumental role in reaching out to globally renowned researchers such as endocrinologist Paul Zimmet in Australia to craft the 1992 survey instrument, continued to highlight race in her discussion of type 2 diabetes. In her oral history interview where she reflected on her time in the Ministry of Health between the 80s and 90s as well as the declaration of War Against Diabetes in 2016, she noted the risk of diabetes based on perceived higher rates of obesity among Malay women:

If you ask me today, I worry about the Malays, just by eyeballing. Previously Malay women were slim. I don't know about the Indians. (Emmanuel January 2022)

Conclusion

In this chapter, I have attempted to present the convergence between postcolonial development, diabetes and race. Specifically, I explored how public health officials and politicians integrated ideas relating to development with the theory of epidemiologic transition, what I call developing diabetes, as a way to construct ideas on progress through diabetes and other chronic diseases that positions Singapore with the advanced nations, thereby lending legitimacy to state policies. Singapore chose to chart its own path in 1965 and this was seemingly vindicated as Singapore developed rapidly between the 60s and 90s, breaking away from its image as a tropical island harboring infectious diseases into a modern, urban island state. However, with development came new illnesses and diseases; access to food and general improved affluence led to a shift in lifestyle and disease patterns. Diabetes, along with a select few chronic conditions emerged as diseases that needed public health attention.

I also explained how the narrative of developing diabetes was inextricably linked with the global history of diabetes, specifically how researchers in Singapore adopted WHO standards and protocols to screen for and diagnose diabetes. These ideas were inevitably touched by local and postcolonial frameworks, which led to a racialized understanding and articulation of diabetes. Somewhat reflective of the milieu of genetics and eugenics at the time, Indian bodies in particular, were figured as being especially susceptible to diabetes owing to their genetic makeup and Neel's thrifty gene hypothesis was an important explanatory tool in the world of diabetes research. At the same time however, medical research surfaced certain behavioral and dietary aspects connected to the Indian population which I argue previews a new mode of biopolitics in

the next stage of Singapore's public health history. The following chapter continues to trace the narrative of racialized diabetes but this time through the disciplinary angle, focusing on public health messaging as well as healthcare financing in managing diabetes.

Chapter 3: Making Sickly, Idle and Risky Minorities

In the previous chapter, I described how postcolonial development in Singapore as a state project became entangled with ideas relating to population health. Specifically, I highlighted how the increasing prevalence of chronic diseases such as diabetes within the population was portrayed by state actors as both a sign and cost of development in accordance with emergent ideas on epidemiologic transition at the global health stage. In a sense, this was a shrewd bit of political maneuvering using public health, a move that ultimately justified the anti-democratic policies adopted by the Singapore government since independence in 1965. This period of postcolonial development also saw the adoption of global health standards and scientific theories relating to diabetes, which inadvertently led to a reanimation of genetics and race in medical scientific debates. This recoupling of race and genetics was not necessarily incompatible with ideas on racial eugenics that flourished in Singapore politics between the 60s and even up to the 90s, courtesy of the racist ideas held by Singapore's first Prime Minister Lee Kuan Yew (Barr 1999).

This chapter continues the thread on race and diabetes but pivots from the global health and development analysis to focus on the ways in which diabetes and an expanding assemblage of technologies such as population health studies and healthcare financing instruments drive nascent modes of racialization at the national level in Singapore. More specifically, I trace the changes in the articulations of racialized diabetes in public health discourse between 1980 to the 2010s, and elucidate the social and historical conditions which enable such a transition. I argue that alongside the

growth of population health in this period, healthcare financing too deserves greater attention in helping us understand racialization in medicine, particularly as they enable new ways of articulating and describing racialized bodies that involve notions of risk and responsibility. Because diabetes is seen as a disease that is hereditary, and also one that is shaped by lifestyle choices, both risk and responsibility become embedded into a biopolitics that engender a cultural understanding of diabetes and diabetic bodies as not just being sickly or more susceptible to diseases but as not having been active enough to prevent sickness and more importantly, reduce the national healthcare burden. Minority Indian and Malay ethnic racial groups in Singapore who have the highest rates of diabetes become the target of such a discourse which highlights, among other things, their idleness and lack of responsibility, thereby sharpening the contours of what constitutes ideal citizen behaviors and bodies.

Race and the War on Diabetes in Singapore

Many Malays are active when they are young - in athletics, football and all. But once they work and have a family, they neglect all these, they don't bother about proper eating. While diabetes is a national issue, the Prime Minister said the disease is a "health crisis" for the Indian and Malay communities during the National Day Rally on Aug 20, given the statistics. Among those above 60 years old, 60 per cent of Indians and 50 per cent of Malays have the disease. The ethnic differences are mainly for Type 2 diabetes, the more common type, which has risk factors that include family history and ethnicity, age and environmental influences, and obesity, said Dr Kevin Tan, consultant diabetologist and endocrinologist at Mount Elizabeth Hospital...A higher prevalence of diabetes in

these ethnic groups translate to a heavier healthcare burden for individuals, families, the community and the nation, he added. (Abu Baker 30 Aug. 2017)

Diabetes mellitus as a disease entity has existed in public radar from as early as the 1960s but not necessarily in the way described above. Between 1965 when Singapore gained independence, and the year 2000, public health discourse on diabetes centered around making changes to lifestyle; politicians called for Singaporeans to avoid ‘excessive eating and drinking’ (Ministry of Culture Mar. 1982), and to adopt a more active lifestyle (Ministry of Culture Aug. 1993; Ministry of Information and the Arts Nov. 2000). In a 2003 parliamentary sitting, the Minister of State for health, Dr Balaji Sadasivan presented a breakdown of statistics for disease prevalence based on the three main racial groups (Chinese, Malay and Indian) in Singapore and explained that vernacular media platforms were being tapped to deliver health promoting messages to the high-risk Malay and Indian racial groups in Singapore (Parliament of Singapore 18 Mar. 2003). The tone of the diabetes discourse would shift around 2014, as speeches and reports begin to emphasize *racialized responsibility and accountability* in the national effort to reduce the prevalence of Type 2 diabetes.

The excerpt at the beginning of this section, extracted from a popular news source, captures this shift in orientation. For a long time, articulations of race in the diabetes discourse were strictly classificatory and served administrative functions (such as multilingual public health outreach); the narratives on diabetes from the mid-2010s changed and became distinctly moralizing especially in articulating racialized responsibility and accountability. The quote highlights the severity of the problem in the Indian and Malay racial communities, supported by an expert statement describing the

risk factors for type 2 diabetes which include family history and ethnicity. The linkage between disease, racialized bodies and risk are therefore tightened. The lifestyles of these risky bodies are also foregrounded: the trend towards idleness as opposed to constant activity, and the absence of dietary management are presented as contributing factors to the health crisis faced by Indians and Malays.

Such forms of articulating diabetes as a public health problem represents the dominant public health narrative in Singapore, particularly beginning in 2014, and it centers around the idea of *sickly, idle and risky* minorities; sickly because of the prevalence of disease among the Indian and Malay populations, idle because of the supposed lack of activity among minority ethnic communities that led to the emergence of diabetes as a serious problem, and risky because of poor dietary practices as well as the supposed hereditary nature of diabetes. This narrative package is consistently expressed alongside concerns of national healthcare burden. Looking at the quote at the beginning of the section again, we see how it points to 'individuals, families, the community and the nation' as having to shoulder the added weight of the diabetes problem, of which the minority communities are significant contributors. Such statements underline the notion of racialized responsibility and accountability constitutive of the sickly, idle and risky minorities narrative.

How do we make sense of the emergence of the meanings described above? What are the conditions that accommodate an increasing 'natural easiness' (Bowker and Star 2000, 93) for such moralizing and racialized statements related to the sickly, idle and risky minorities? In accounting for this subtle yet profound shift, this chapter casts a spotlight on a hitherto neglected area in the study of race and medicine. Where

existing research has highlighted the roles of race science (Montagu 1945; Stepan 1982; Gould 1996; Duster 2004), colonial racial management (Levine 2013; Seth 2018; Loh and Hsu 2019), the political economy of biomedicine and pharmaceuticals (Kahn 2012; Ong 2016; Sun 2016; Deomampo 2019), bureaucratic initiatives (Epstein 2009) and social movements (Fullwiley 2008; Wailoo 2014; Tuchman 2020) in shaping the association between race and medicine, few have investigated how healthcare financing as a technology of biopolitics, engenders racial meanings in public discourse.

This chapter attends to this lacuna through a serious consideration of healthcare financing, specifically the development of an ‘insurantal imaginary’, defined as a social context in which ‘profitable, useful and necessary uses can be found for insurance technology’ (Ewald 1991, 198), as a condition that shapes the articulation of the sickly, idle and risky minorities. I argue that the notion of sickly, idle and risky minorities could not have emerged in a system of national healthcare financing based on forced savings and government subsidy. A key requirement was the introduction of risk pooling in public discourse in 2014, when the Singapore government began considering universal health insurance. Risk pooling in a national insurance system effectively means that the higher medical costs of the less healthy are offset by the lower cost of the healthy. A national health insurance system centered on risk pooling represented a significant departure from previous systems because it entails the *socializing of risk*, redistributing responsibility and accountability in managing health and risk from individuals, to a collective (Ewald 1991). Crucially, this step catalyzes a nascent insurantal imaginary, one that I argue converges with preexisting racial discourse to animate the articulations of sickly, idle and risky minorities in Singapore’s War on Diabetes.

In investigating the relationship between insurance technology and its implications on public health discourse, I also present a contrasting case to the expected trajectory of contemporary biopolitics. Where states are expected to employ individualized biopolitics in line with the precision medicine movement and the molecularization of life (see Rose 2001), ideas on race, ethnicity and the nation have not only endured this transformation but as shown in this here, emerged as crucial components of biopolitical governance in Singapore. For postcolonial states such as Singapore, racial biopolitics remains a crucial mode of governance and is entangled with the narrative of national vitality and survival. In this regard, my research builds on the work of scholars who have argued for the continued relevance of race, ethnicity and nation in science and medicine in Asia (Ong 2016; Sun 2016; Liu 2017; Sung 2010).

Diabetes, Biopolitics and Risk in Contemporary Biomedicine

The meanings surrounding race in biomedical discourse revolves around changing configurations of actors, institutions and technoscientific objects across history (Hatch 2016). Accordingly, the narrative of sickly, idle and risky minority that emerged out of the War on Diabetes needs to be situated within a particular paradigm, *risk politics* (Rose 2009). But what exactly is meant by risk politics and how exactly did we arrive at this historical juncture? Rose (2009) argues that where biopolitics, understood as a form of governmental management of life through the mobilization of discursive and material technologies, had depended on state cultivation of a Darwinian notion of national population fitness or the nation's health towards the end of the twentieth century, contemporary biopolitics is posed in 'economic terms' where illness equated

with lost productivity or rising insurance premiums, or 'moral terms' such as the imperative to reduce health disparity (Rose 2009, 5).

A key part of this biopolitical landscape is risk politics where the state undertakes various strategies to 'identify, treat, manage or administer those individuals, groups or localities where risk is seen to be high' (7). Hacking (1990) asserts that the rise of risk thinking goes hand in hand with the rise of a statistical society in the 19th century, when the stochastic framework was integrated into the art of government that enabled the management of indeterminacy. While at the very basic level, statistical technologies such as population surveys and statistical models make the governable population legible, they have also been shown to help predict population productivity under the banner of 'human capital' (Kenny 2015), help generate and anticipate needs (Murphy 2017) and guide economic decisions on government investments (Griffen and Timmermans 2020). In short, statistical thinking permeates all levels of government in contemporary society in the service of the broader objectives of governmentality - maximizing productivity and minimizing risk (see Foucault 1991).

Risk politics as the dominant form of biopolitics presents itself most clearly in the preventative medicine approach, which relies on various forms of scientific techniques to both elucidate the prevalence of disease in the population as well as predict its trajectory, thereby allowing for intervention. For Rose (2009) and other commentators on biomedicalization (see also Clarke et al. 2003), the ever-expanding reach of biotechnology into everyday life serves as an important catalyst to the visibilizing of risk. In the case of diabetes, modern, convenient and accessible biomedical techniques such as the HbA1c (Hemoglobin A1c) blood sugar tests as well as 'simpler' screening tools

that incorporate risk factors such as age, obesity and a history of diabetes in the family help identify diseased and at-risk bodies that can then be better managed.

Diabetes screening programs were actively promoted in Singapore since the early 2000s (Ministry of Communication, Information and the Arts July 2002; Ministry of Communication, Information and the Arts Nov 2003). Screening is complemented by a more systematic long term population health surveillance - large scale epidemiological surveys - that help track and project the prevalence of diabetes. In Singapore, population level data from the 1992 national health survey showed an increase in diabetes prevalence when compared to estimations from previous studies (Tan et al. 1999). Another arm of preventative medicine entails the education of the population to inculcate of good physical and moral habits, a move that formed part of the core strategy of the Singapore government since it launched the Singapore National Health Plan²² in 1983 (Haseltine 2013). Increasingly, Rose (2009) asserts that risk politics has adopted new modalities for the calculation of risk, one that extends biomedicalization to the 'molecularization' of life. Advancements in genome sequencing technologies ushered in a new promise of personalized or precision medicine, where risk scores for diseases can be generated based on one's genetic profile (see also Sun 2016).

Thus far, I have described three conditions that feed into the social and political salience of diabetes in Singapore: 1) the existence of diabetes as a *significant* disease entity since the 90s, 2) a highly racialized socio-political system that figures minorities

²² Broadly speaking, the healthcare plan set out to transform healthcare financing through the institution of forced savings (in addition to already existing government subsidies), as a way of inculcating an ethos of self-responsibility into the citizen body.

as diabetics and 3) risk politics as part of the preventative paradigm. Seen together, these conditions seem to bode well for the emergence of a narrative such as the sickly, idle and risky minorities and its attendant moral connotations. Yet the kind of racialized narrative of responsibility and accountability we saw at the beginning of this chapter only emerged in political and public health discourse in the mid-2010s. This is where I position my intervention. While cutting edge biomedical technologies such as population surveillance and genetics have taken center stage in the calculus of risk politics and broadly contemporary biopolitics, there are ‘legacy’ mechanisms that have thus far been overlooked.

In particular, I posit that healthcare financing forms a key technology of biopolitics mainly because it shapes life, death and health. In the US where healthcare financing mainly occurs through health insurance, individuals without health insurance or are underinsured very often live in poor health with low quality of life (see Sommers, Gawande and Baiker 2017). Health insurance also affects health seeking behaviors, with individuals sometimes having to resort to informal strategies that present their own set of issues (Raudenbush 2020, 2021). Here we can see how healthcare insurance (or lack thereof) as a mode of financing treatment creates new social groupings and risk categories that predict health outcomes. Oftentimes these categories overlap with socioeconomic status and race (Williams and Collins 1995; Hankin and Wright 2010). Moreover, healthcare financing at the national level can be seen as citizenship projects that ‘bind national subjects together in the sharing of risks’, giving rise to moral imperatives and ethics connected to both individual and national health (Rose and Novas, 2003, 1). It is crucial to therefore examine the impact of healthcare financing

systems not just in terms of its health outcomes but also in the way that it shapes relations to the self and social identities.

Francois Ewald (1991) defines the 'insurantal imaginary' as a social context where 'profitable, useful and necessary uses can be found for insurance technology'. The operative term in the definition is *social context* since for Ewald (1991), the very technology of insurance emerges out of a configuration of statistical society that renders risks calculable²³. But insurance does not just draw from social context. It is important to recognize that insurance as a technology shapes social context as well. Just as insurance transformed one's relationship with nature (as individuals became assured with means to repair bad luck) insurance as a 'political technology' also created a new social contract based on collective interests, under which members can all agree to protect against poverty and insecurity by way of making minimal contributions (Ewald 1991, 207).

When we think about insurance technology in relation to governmentality, we also have to consider the ways in which it has been deployed to manage collective interests and this is where the assemblage of statistical knowledge, biomedical technology, preventative health measures and healthcare financing become especially salient. At the level of national health policy for instance, insurance as a way of

²³ Ewald (1991) highlights two other features of the insurantal imaginary. The first is the collective nature of risk under insurantal imaginary; accidents or a turn in health is no longer regarded as a case of individual or familial misfortune. The system of insurance ties individuals to a larger whole where one's conduct (or misconduct) presents inherent risks to others. Another feature of risk is capital. What is insured is not injury or even death. Rather, insurers guarantee compensation for potential loss. Insurers sell the idea of life as having risks and get people to willingly pay insurance premiums. Under an insurantal imaginary then, risk becomes converted into capital for the insurers.

financing healthcare also becomes tied to specific narratives of race, risk, health and biological citizenship. By biological citizenship, I mean the ways in which notions of national belonging become intertwined with the biological responsibilities of citizens i.e. the way they maintain their bodily health as productive citizen subjects (Rose and Novas 2003)²⁴. In the case of Singapore, I argue that public health narratives relating to diabetes, did not utilize the vocabulary of racialized accountability and responsibility tied to national interests – all integral components of the sickly, idle and risky minority bodies narrative – prior to the establishment of national insurance. Under a system of national healthcare financing based on forced savings and government subsidy, responsibility and accountability for health are *individualized*, since citizen subjects themselves are accountable for most of their healthcare cost and in effect, health. Absent an insurantal imaginary, the language of accountability and responsibility towards broader collective interests as Ewald (1991) described, did not manifest.

In 2014 however, the Singapore government floated the idea of a significantly different healthcare financing model and in 2015, took the step of implementing a

²⁴ In their discussion of biological citizenship, Rose and Novas (2003) highlight the various historical and technoscientific changes that animate notions of biological citizenship. This includes race science and eugenics in the 20th century and very recently with the advent of genomics in the 21st century, the notion of biovalue which differentiates the worth of citizens based on their anticipated value in the global biomedical and biotechnological economy. Yet, the production of biological citizenship as a way of delineating populations is not necessarily top down. The authors highlight that individuals and groups that identify with biological categories such as a disease, actively participate in either the reproduction of biological citizenship based on authoritative definitions or in some cases, even push back against these definitions that allow them to reshape policy, perceptions of disease and in some cases, scientific practice. This was evident in Steven Epstein's (1995) examination of AIDS activism in the US, where members of the AIDS community pushed back against researchers and government officials through constructing themselves as lay experts in order to gain access to experimental treatment.

universal national health insurance system as a way of pooling risk. Pooling risk entails the *socializing* of risk, redistributing responsibility and accountability in the management of risk from individuals to a collective (Ewald 1991). Crucially, this step catalyzes a nascent insurantal imaginary, one that converges with the existing racial discourse to enable a moralizing language of racialized responsibility and accountability where minority racial groups and their health woes are deemed as problematic to the health of the nation. In short, the instrument of insurance allowed for collective interests to coalesce into a coherent vision of population health that ties the (mis)fortunes of ethnic racial minorities to the nation. The insurantal imaginary in this case, imbricates with Singapore's postcolonial and multicultural political imaginary which stresses the importance of racial identity (Goh 2008) and 'cultural citizenship' (Chua 2007) to ensure the survival of a national body politic. It is this emergent insurantal imaginary that enables the articulations of sickly, idle and risky minorities in Singapore's War on Diabetes.

A Brief History of Healthcare financing in Singapore

In this chapter, I trace the genealogy of present concerns (relating to War on Diabetes declared by the Singapore government in 2016) to shed light on the development of the sickly, idle and risky minority bodies in relation to developments in healthcare financing. Specifically, I pay attention to how politicians discuss and debate issues relating to diabetes in parliamentary sittings between 1960 and 2020. This specific period was chosen so that the paper would be able to capture the full spectrum of healthcare financing policies from the late colonial period to the more recent national

universal healthcare insurance coverage (implemented in 2015) central to the forthcoming analysis.

The documents from parliamentary sessions were extracted from the free and publicly accessible Singapore Parliament Hansard database. To compile a corpus of archival material for my analysis, I used the search term 'diabetes' and limited the search to between 1960 and 2020. This returned 229 documents, which were then carefully read for relevance. Documents that mention diabetes only in passing or without any meaningful discussion (examples that comes to mind are discussions about public healthcare infrastructural development where diabetes is mentioned alongside other chronic diseases, or politicians bringing up cases of individuals who face hardships and are incidentally diabetic) are excluded from the final compiled corpus of parliamentary proceedings. In the end, a total of 149 articles became part of the corpus.

These documents were then put through an initial process of open coding by the researcher. The initial open coding phase yielded 23 thematic categories. These themes were then grouped together after a second phase of reading and axial coding, leading to the following thematic categories: 1) racialized articulations on health 2) healthcare financing 3) public health measures 4) public health infrastructure and 5) medical practice. A third round of more selective coding reduced these 5 categories to focus on 1) racialized articulations on health 2) healthcare financing and 3) public health measures. Other primary sources such as policy papers and public health speeches, which are accessible online through the National Archives of Singapore or published news articles, were also used but mainly to corroborate the information gleaned from the parliamentary sessions. I also used secondary sources in the form of scholarly

writing on the history of healthcare financing in Singapore to both support the details described in the parliamentary discussions as well as to highlight the way that healthcare in Singapore is framed from various expert perspectives.

Ultimately, the 'discovery' of the difference in the way that public health concerns were articulated was made while analyzing the three analytic categories over the specified historical period, with healthcare financing in particular emerging as the key component (or independent variable) shaping the articulations on diabetes that correspond with the sickly, idle and risky minority bodies. Singapore's healthcare financing system is one of the most highly regarded in the world, with comparatively low expenditures per capita and positive health outcomes for the population across a wide variety of measures. Under the British colonial administration, healthcare services were provided to the population free of charge and was largely financed through taxes (Chee 1982). This model would change as Singapore gained independence, with the introduction of a nominal fee of 50 cents for a visit to any one of the 26 publicly run outpatient dispensaries on the island.

Under the free healthcare model, the healthcare system was often strained because individuals would either turn up at the clinics with the slightest symptoms or to get a medical certificate in order to be excused from work (Parliament of Singapore 16 Nov. 1964). Introducing a fee would hypothetically deter such behavior since it forced people to seriously consider their situation before making a financial commitment, even if it is a small amount. Moreover, the charge was introduced as a way to reduce wastage as well as inculcate a sense of self responsibility into the population. In his memoir, the Prime Minister of Singapore Lee Kuan Yew implied that people who pay for

their healthcare are more likely to stick to their drug regimen and eventually get well, compared to those who do not (Lee in Haseltine 2013, 7).

We see here the incipient rhetoric of self-responsibility and efficacy in healthcare as political actors enact a break from the perceived operational and economic inefficiencies of the colonial system. In the process of redesigning the healthcare system, citizen bodies are enlisted to aid in the minimizing of waste and in caring for their sick bodies. Here, healthcare financing can be understood as a technology of disciplinary power that seeks to modify behavior through the establishment of a flat rate payment for service system²⁵. Crucially, healthcare financing as a technology of discipline also serves to create self-responsibilized citizen subjects who are able to rationally calculate the consequences of their actions. This form of subjectivity would be transformed as subsequent healthcare financing regimes bring to bear new modes of discipline on the population.

The model of flat fee healthcare financing changed drastically in 1983, when the National Healthcare Plan was rolled out. The introduction of Medisave under the plan was key to the transformation of healthcare financing. Medisave is essentially a forced savings scheme modeled after the Central Provident Fund, a retirement savings scheme that was carried over from the British colonial era. Working individuals would contribute a percentage of their monthly salary to the Medisave fund, which can then be used to pay for public or private health services, and to purchase health insurance

²⁵ As a technology of disciplinary power, healthcare financing is but one facet of the public health in postcolonial Singapore. Clancey (2018) provides us with another dimension of public health management in the form of mass rehousing and other hygiene policies to reduce the incidence of infectious diseases.

(Haseltine 2013). The Medisave scheme formed part of a broader healthcare system restructuring where the government initiated a series of private-public partnerships in the healthcare sector to improve quality of care and reduce operational cost. The plan also highlighted the need to shift the healthcare focus from infectious disease towards chronic diseases as well as the active promotion of a healthy lifestyle to ward off diseases, the latter a nod to growing salience of the preventative health paradigm.

If the previous change was aimed to shape new behaviors surrounding health, the introduction of Medisave as the main mechanism for financing healthcare solidified the creation of self-responsibilized subjects by expanding the share of individual healthcare financing. The Singapore government continued to subsidize healthcare, even covering healthcare bills for the very poor. However, under this new system, individuals were expected to pay for healthcare services either out of pocket, or by utilizing their Medisave funds. The reasons behind this policy are very much aligned with the earlier rhetoric on cost savings and the reduction of wastage. However, the threat is no longer the profligate healthcare consumer throwing out their free pills. Rather, politicians point to 'liberal cradle to grave' healthcare systems provided by countries such as 'Britain, West Germany, France, Italy, Australia and Japan' which are overburdened due to ballooning costs and are in danger of imminent failure²⁶ (Parliament of Singapore 30 Aug. 1983).

²⁶ In Britain, a patient was diagnosed as a case of detached retina two years ago. She still has no appointment for her eye operation. She is forced to wait for treatment from the National Health Service simply because she cannot afford the cost of private treatment, and there is a long queue waiting for eye operations. (This case was reported in the 11th August issue of The Listener.) In a sense, she does not have proper access

Another round of changes was introduced in healthcare financing based on the findings from a ministerial committee that was tasked to evaluate healthcare costs in 1993. While the Medisave system had been in place for about a decade, Singapore was still grappling with the issues of rising healthcare costs and affordability. The Affordable Health Care White Paper released in 1993 outlined the basic philosophy of healthcare in Singapore that emphasized the provision of 'maximum incentive to stay healthy, save for his medical expenses and avoid using more medical services than he absolutely needs'. A new direction that formed the backbone of the committee's recommendation was the initiation of public-private partnerships in healthcare operations and expose the system to market forces while still maintaining a degree of state control. Another key component of the white paper was the recommendation for an expanded use of medical insurance in the form of Medishield.

Medishield, which was introduced in 1990, formed part of the 3M healthcare financing system – Medisave, Medishield and Medifund – that continues to this day (Haseltine 2013). Essentially, Medishield served as a state maintained, basic health insurance to cover catastrophic hospitalization and treatment bills that a patient's medisave would not be able to cover. Individuals were able to pay the Medishield premiums using their medisave and from 1993, the government allowed for the use of medisave to purchase comparable private insurance plans as well as introduced different tiers of health insurance for individuals who might want higher standards of hospital care. The Medishield scheme represented the first foray into the use insurance

to the National Health Service even though she has paid for the service, in advance through taxes (Parliament of Singapore 30 Aug. 1983).

as a way to finance healthcare in Singapore. Crucially, it represented a shift from various forms of self-financing and subsidized healthcare to a blended system which includes insurance²⁷.

The Development of Insurantal Imaginary

It is worth revisiting the concept of insurantal imaginary to understand the significance of the Medishield scheme. Francois Ewald defines it as a social context where 'profitable, useful and necessary uses can be found for insurance technology' (Ewald 1991, 198). While the archival sources do not explain the profit mechanism for insurers in Medishield, what was clear from policy documents and parliamentary discussions was that it was meant to mitigate unexpected healthcare costs. More importantly, Medishield as part of an emergent insurantal imaginary served a useful function of maintaining the burden of healthcare financing, especially in the case of catastrophic medical events (which was the main reason why Medishield was introduced), on the side of consumers rather than the government. In this regard,

²⁷ Broadly speaking, all of the basic treatments, services and drugs for all diseases) including type 1 and 2 diabetes) available in government hospitals and clinics are subsidized. This is before patients use their medisave or supplement it with out-of-pocket payments. Essentially, a patient who has diabetes needing prescription drugs, treatment for a wound or infection or perhaps needing dialysis because of kidney failure would already be paying subsidized rates. Another way in which the government is able to prevent ballooning medical costs both on the demand and supply side is through price control and transparency. The Singapore government is also able to set prices for treatment in public hospitals and clinics and ensures that these prices are well publicized and accessible. While the government does not engage in price control for drugs, it subsidizes drugs which are deemed effective included in the List of Subsidized drugs (List of Subsidized Drugs Ministry of Health). This includes drugs for diabetes treatment such as Metformin, Chlorpropamide and Tolbutamide.

Medishield was and continues to be a governmental technology as much as it is an insurance technology.

The move towards a fully developed 'insurantal imaginary' in the 90s was somewhat tentative, mainly because Medishield remained an optional component of healthcare financing for individuals. At the time the 1993 white paper was released, only about 1.5 million Singaporeans or about half of the population was covered under Medishield. As a 'risk pooling' technology then, Medishield had limited reach given that only drew from half of the potential resource pool. There was also some trepidation in proceeding with a health insurance model. The 1993 white paper warned against moving towards an 'unrestricted and open-ended medical insurance as practiced in the US, which would lead to the over-provision of medical services and escalating premiums' (Affordable Health Care 1993, 43). The proposed solution was a medical insurance system that required co-pays and deductibles. As a political technology, the early 1990s version of Medishield did not necessarily alter the discourse on health and responsibility. Technically, Medishield socialized risk by redistributing the cost of injury and illness across the population and over time. In reality however, the type of insurantal imaginary under this system of partially insuritized population was still oriented towards *individualized* responsibility, risk and security. The very language of the 1993 white paper stressed 'individual' and 'personal', rather than collective responsibility (Affordable Health Care 1993, 2).

In 2015 the Singapore government took a drastic step of implementing a comprehensive, universal national health insurance system called Medishield life and heralded the concept of *risk pooling* at the national scale. Individuals will be able to

draw from a larger resource pool to defray large medical expenses. This also means that the risk of injury or illness and the financial burden that comes with treatment would become spread *over the whole population*, thereby maximizing the redistribution of accountability and responsibility to a bigger collective compared to earlier insurantization efforts. While earlier iterations of the healthcare financing enlisted citizens as individualized, self-responsibilized subjects, a national health insurance socializes, even nationalizes risk. Individuals become accountable to each other within this shared pool:

The scheme requires that everyone co-shares in this risk pool...it requires all Singaporeans and PRs to collectively participate and to share in enabling healthcare protection for all. (Ms Jessica Tan Soon Neo in Parliament of Singapore 29 Jan. 2015)

Crucially, a national health insurance shifts the idea of responsibility from 'personal' and 'individual' as seen in the 1993 Affordable Health White Paper to one that is collective as articulated in the Medishield Life Bill in 2015. In short, the discourse of risk and responsibility in health shifts from being individualized to being socialized. The following example captures the paradigm shift:

The universality of the MediShield Life scheme and the attendant risk-pooling means that the problems of smokers are now all our problems. The impact of smoking related diseases will increase the premiums for all Singaporeans, unless we continue to act to help people stop smoking. (Dr Janil Puthuchearu MP Pasir-Ris Punggol in Parliament of Singapore 29 Jan. 2015)

The shift in vocabulary is subtle yet powerful. Under a new insurantal imaginary, there is heightened awareness of risky categories and groups, especially if these groups are deemed as being genetically risky or are inclined to behaviors that contribute to increased likelihood of illness and disease that could potentially lead to increased premiums for the rest of the population. The figuring of smokers as ‘problems’ represents one way in which risk is designated to sub-populations under the insurantal imaginary. Importantly, the idea of socialized responsibility and risk translates into a *moral technology* of government that provides an urgent impetus for programmatic intervention (Ewald 1991). The comment above reflects such an orientation where smokers, having been figured as potentially ruinous to the stability of premiums, should be ‘helped’ to quit the habit ²⁸. The forthcoming section provides an example of how the emergent insurantal imaginary intersects with the war on diabetes and race as a ‘risk’ category to engender new forms of racialized narratives that operate as moral technology²⁹.

²⁸ Aggressive anti-smoking policies in Singapore has resulted in drastic reduction of smokers within the population. According to a news report Singapore’s smoking rate has shrunk from 18.3 per cent in 1992 to 10.6 per cent in 2019 (Mahmud Dec. 2020). Examples of some policies include heavy regulation of tobacco advertising and anti-smoking campaigns featuring explicit messaging. The government has also raised the minimum legal age, made tobacco products more expensive with higher taxes, and prohibited smoking in many public places.

²⁹ Even if the target of government intervention is decidedly different, the modes of government interventions and problematization in matters of health such as smoking and diabetes ‘share a family resemblance’ (Rose, O’Malley and Valverde 2006, 88). They relate to broader notions of the state of the economy, a productive population and minimization of risk. Today, these ideological concerns are often represented in public health discourse as disease burdens and cost to the national economy. The interventions that are designed to modify behaviors in groups are also isomorphic – government committees are set up to evaluate the available information and implement campaigns that rely on extant intervention infrastructure such as community self-help

The Emergence of Sickly, Idle and Risky Minority Bodies in the War on Diabetes

In a 2003 Parliamentary sitting, a member of parliament, Mr Arthur Fong, explained that some of his constituents who belonged to the minority racial groups were not aware of the health improvement initiatives run by the Health Promotion Board (HPB), a government agency. Specifically, Mr Fong was concerned that the programs were not accessible to 'non-mainstream language speaking minorities' (Parliament of Singapore 18 Mar. 2003). The concern here, seems to center around language accessibility more than anything else. Another member of parliament, Mr Ahmad Khalis Bin Abdul Ghani, asked if the Ministry of Health has observed, through population level data, any correlation between 'cultural and ethnic backgrounds and a propensity towards certain diseases'. Mr Khalis also asked if education was a relevant factor in understanding disease prevalence, explaining that such information would help in the creation of targeted programs for groups who 'speak certain languages, prefer a certain diet and subscribe to certain cultural practices' which would result in 'better buy-in'. The Minister of State for Health, Dr Balaji Sadasivan replied in the same session:

Diabetes is more prevalent among Indians (16%) than Malays (11%) or Chinese (8%) ...In view of the higher prevalence of risk factors for chronic diseases among Malays and Indians, special media programmes have been produced. A 20-part cooking programme was aired on Suria to educate the Malay community on cooking tasty and healthy traditional dishes...With regard to the Tamil media,

groups which are essentially race based organizations. All of these elements combine to produce a very distinct form of 'governmentality' (Foucault 1991), one that Chua (2007) terms 'political culturalism'.

a 13-part health programme addressing health issues such as diabetes and hypertension, prevention and proper treatment to prevent complications was produced in Tamil for telecast on Vasantham Central. We will continue to focus our attention on high-risk groups and provide more publicity on health promotion activities in the Malay and Tamil media. (Parliament of Singapore 18 Mar. 2003)

At this time, the universal Medishield Life scheme which I argue shapes the articulation of sickly, idle and risky minority bodies, had not yet been implemented. Regardless, racialized articulations of disease in public health discourse such as that exemplified above certainly existed; the vocabulary of race, prevalence and risk for instance, came through very clearly in Dr Balaji's response to the other members of parliament and the utilization of these frames are a result of a confluence of factors – the dominant multicultural discourse, a paradigm of preventative healthcare and finally the presence of large scale epidemiological surveys such as the 1998 Singapore National Health Survey that render disease visible at the population level. In his response, Dr Balaji Sidasivan describes Malays and Indians as being at higher risk for chronic disease, thereby justifying 'ethnic-appropriate' interventions such as the airing of food and disease information programs in the Malay and Tamil speaking television channels. Such statements, while employing the vocabulary of racialized risk still lack the moralizing tenor highlighted at the beginning of the paper. By moralizing tenor, I mean explicit calls for ethnoracial minorities to behave responsibly, and be held accountable to the rest of the population shouldering the burden of healthcare financing under a new national health insurance system. The vocabulary of prevalence, risk and

accountability, are crucial characteristics of the narrative of the sickly, idle and risky minorities which would surface more clearly the forthcoming quotes.

We can now turn our attention to a particularly interesting parliamentary sitting held on the 8th of July 2014 where the idea of a universal national insurance proposed in the findings of the 'Medishield Life Review Committee Report' was being debated. It is worth noting that at this juncture, all of the members of parliament would have been exposed to the idea of *national risk pooling* either through privileged political communication for the parliamentary session, or through the media release of the committee report dated the 27th of June 2014:

The report by the MediShield Life Review Committee is another positive step towards building a more inclusive and caring society in Singapore...It was also said that there are still many Malay Muslims who do not practice healthy food choices and are less involved in physical activities. In the 2010 National Health Survey Report, Malays are the most affected by hypertension and the second most affected by diabetes compared to the other communities. I believe that the present efforts are commendable. But looking at the latest situation, I feel that improvements may need to be made. Madam, I believe that with proper long-term planning, as well as effective implementation, the issue of health within the Malay Muslim community will shift to a more positive situation. When this happens, it will become a contribution by the Malay/Muslim community towards a better management of inflation of healthcare costs in Singapore. Mr Muhamad Faisal Bin Abdul Manap. (Parliament of Singapore 8 Jul. 2014)

In the quote above, we see the state of health in the Malay community being discussed by a member of parliament. While the war on diabetes had not yet been launched in 2014, we can observe here the data on diabetes prevalence being raised as a pressing issue for the Malay community. Malays are the 'second most affected by diabetes' behind the Indian community. Malays are also figured as being 'less involved' in physical activities, thereby underlining the idleness that has led to this prevalence of sickly bodies. Malays are also presented in the quote as compounding the risk of disease by engaging in risky behaviors such as eating unhealthy food choices. If we compare it to the quote beginning of the paper, where Malays are described as neglecting exercise and not bothering about eating properly, the tone of the comment made by Mr Muhamad Faisal Bin Abdul Manap here is similarly moralizing. This is fairly distinct from the comments made in the earlier 2003 discussion on targeted policies.

Significantly, the member of parliament also drew links between the state of health in the Malay community, to healthcare financing in Singapore, explaining that the improvement of the state of health for the Malay community would contribute towards improved management of healthcare cost in Singapore. Note that the point of the transition towards medishield life was to alleviate Singaporeans' concerns about having to contend with high bills for healthcare services in case of emergency. Here, the community is described under an emergent discourse of collective responsibility, as helping to stabilize the demand for healthcare services and prices that would benefit the broader society. This concern is very specific to the idea of risk pooling under an emergent insurantal imaginary.

The table below summarizes the types of racialized articulations under two different healthcare financing systems:

Table 1: Healthcare financing systems and their racialized implications

Healthcare financing system	Healthcare paradigm	Type of racialized articulations
Forced savings/self-funded	Self-sufficiency and responsibility	Administrative/descriptive categories
Forced savings/self-funded + Universal/Medishield Life Healthcare Insurance	Insurantal imaginary emphasizing collective responsibility and risk pooling	Racialized responsibility and accountability

The notion of collective responsibility under risk pooling holds obvious parallels with the preexisting notion of collective responsibility in Singapore's communitarian democracy. In a society where the individual is constructed as being part of larger social unit, the individual also has obligations and responsibilities towards the collective, recognized as the nation as well as racial ethnic communities that individuals belong to (Chua 2005; Goh 2008; Lian 2016). The communitarian ideology is especially crucial in justifying limitations to forms of speech that could potentially disrupt the carefully managed racial and religious harmony in the island nation, given its history of racial conflict in the 60s (Tan 2005). The cost or even risk of foregoing one's responsibilities to

the communitarian political configuration is the uncontrollable descent into violence. In the realm of biopolitics under an insurantal imaginary, neglecting one's responsibility to health would result in significant financial burden to the healthcare system and of course, increased premiums for all.

The following quotes further illustrate the emergent discourse on the sickly, idle and risky minority bodies:

On health promotion among ethnic minorities, we are seeing greater awareness among Malay and Indian communities on health matters but there is more to do...Sir, allow me to share in Malay some of the initiatives for the Malay community. Staying healthy is a lifelong commitment. We are working with many community partners to help the Malay community stay healthy at each stage of life...We have taken steps to collaborate with caterers to slowly change the way we eat at the community level...Through this effort, it is hoped that the community can gradually grow to like healthy food that can still taste delicious.

Mr Amrin Amin (Parliament of Singapore 7 Mar. 2018)

This quote, picked out from a 2018 parliamentary sitting, was essentially an update on the war on diabetes. Mr Amrin Amin, who was then the Parliamentary Secretary to the Minister for Health, went through the programs that have been implemented to improve the situation of diabetes prevalence in the minority ethnic communities in Singapore. The framing of the war on diabetes is consistent with that provided by the Prime Minister of Singapore at the beginning of the essay – while the whole nation grapples with the issue of diabetes, the problem is especially acute within the Malay and Indian communities, which has led to targeted interventions outlined in

the quote. Underlining the need for a lifelong commitment to stay healthy, Mr Amrin Amin outlined the need to 'change the way we eat at the community level' and harbors the hope of modifying the taste of the Malay community. The presumption behind this statement is that the type of food the Malays consume, which is supposedly Malay ethnic cuisine, is inherently harmful and contributes to the risk of diabetes in an already sickly community.

This pattern of racialized public health discourse can be observed in the same parliamentary session by Mr Amrin Amin regarding the other minority group:

Community organisations like the Hindu Endowment Board and SINDA are actively promoting healthy living to the Indian community. We want to complement and build on these efforts in three ways. One, we will intensify health outreach to the Indian community through places of worship, Indian F&B outlets and Indian media to promote healthy eating, regular physical activity and regular screening and follow-up. Two, we are partnering Sikh and Indian temples to bring health programmes, such as screening, exercise and healthy cooking programmes. Third, we will leverage social networks to train Health Ambassadors and equip them with skills to actively reach out to and promote healthier living to their families and friends. Mr Amrin Amin (Parliament of Singapore 7 Mar. 2018)

What's interesting in the quote above is that the idea of sickly, idle and risky minority bodies is framed as being in need of ethnic community-based solutions. In the case of the Malay community for instance, Mr Amrin Amin outlined efforts to work with

‘community partners’ (in the later part of the speech he actually highlighted the role of mosques as sites for intervention given that most Malays in Singapore are Muslims). The same could be said with the Indians in Singapore, here Mr Amrin Amin described a multi-pronged outreach across various sites and platforms that are decidedly ‘Indian’. This is not an entirely new phenomenon in Singapore. Problems relating to educational underachievement in the Malay community for instance, have also been dealt with through ethnic community-based organizations and initiatives (Lily Rahim 1998) and is very much in line with the ‘political culturalism’ – a form of racial representational politics that shapes the framing of problems and solution – that has been built into Singapore society (Chua 2007; Goh 2008; Lian 2016).

That said, what sets this analysis apart is how closely these initiatives of health promotion for racial minorities are tied to the health of the nation. In a 2019 parliamentary sitting, Mr Amrin Amin, who by this time has become the face of minority diabetes improvement, outlined similar measures targeted at reducing the prevalence of diabetes among minorities. Crucially, Mr Amrin Amin expressed how these programs will contribute to a ‘healthy Singapore’, connecting the minority community with the state of health for the nation (Parliament of Singapore 6 Mar. 2019). Recall that this move was also made by Mr Muhamad Faisal Bin Abdul Manap in a 2014 parliamentary sitting, where the health of the Malay ethnic community was seen as an integral component to stabilize inflating healthcare costs in Singapore. This linking of ethnic minority health to the health of the nation reflects an emergent language of accountability in the diabetes discourse, one that is nested within the broader insurantal imaginary.

Insurantal Imaginary, Biological Citizenship and Non-Resistance?

In this chapter, I have sought to highlight the importance of healthcare financing and how it shapes the meanings surrounding race in the discourse on diabetes. The focus on healthcare financing has thus far escaped the attention of scholars studying the intersection between race and disease. I demonstrate how the transformation of health financing in postcolonial Singapore – from a system solely based on forced savings and government subsidy to one with a universal national insurance component – engendered an emergent insurantal imaginary which in turn shapes meanings surrounding race and diabetes in political and public health discourse. As socialized risk converged with extant multicultural socio-political modalities in Singapore, it allowed for the articulation of the sickly, idle and risky minorities infused with moralizing language that stressed racialized responsibility and accountability in fighting diabetes. The prevalence of diabetes among minorities matters more under the insurantal imaginary because risk pooling affects everyone involved; the disciplining of minorities through public health discourse reflects this sentiment, as programs are rolled out to manage sickly, idle and risky minority bodies through ethnic, community-based organizations and solutions.

Narratives of racialized responsibility and accountability engender shifts in biological citizenship, especially in how it connects with the broader project of ‘making up’ ideal citizens by governmental institutions (Rose and Novas 2003). Biological citizenship in postcolonial Singapore had entailed the fervent embrace of population eugenics by the founding Prime Minister of Singapore Lee Kuan Yew (Palen 1986; Barr, 1999; Amrith 2010), Lee held a firm belief that the future of Singapore depended on

policies that encouraged reproduction among desirable classes of people (such as university graduates) and the curtailment of reproduction (through sterilization campaigns) among the less educated, lower income and therefore less desirable (Palen 1986). These beliefs have also been construed as forming part of Lee's broader racist beliefs, where he saw the different racial groups as having different innate biological capacities to thrive and succeed in the face of challenges (Barr 1999).

Such policies and beliefs received considerable public backlash; Chan (1985) pointed out that the 'Orwellian schemes' (708) sparked public outcry, and the dissatisfaction against this mode of biological citizenship was made clear in the 1984 elections where Lee's People Action Party (PAP) lost a large share of voters to the opposition. The eugenics guided policies, particularly the graduate mother scheme was then rolled back, although programs that incentivize sterilization and other means of limiting of the number of children among low-income individuals still exist in Singapore under the Home Ownership Plus Education (HOPE) Scheme³⁰. This particular incident in the 80s represents an instance of pushback against top-to-bottom implementation of biological citizenship in Singapore's history. Lee Kuan Yew's views on graduate women and their essential reproductive roles were seen as being especially offensive to the

³⁰ The HOPE program was covered in an online publication by Singapore sociologist Teo You Yenn (Teo 2021). It entails housing, training and education grants for low-income (gross monthly household income SGD 1700 or less) for married couples or single mothers who have custody of children if they commit to having no more than two children. Teo (2021) highlights that the 'grants are disbursed in most generous forms (i.e. over a shorter time period) when recipients undergo irreversible sterilization. Curiously, the detailed information that Teo (2021) presents in the publication is no longer available on the Ministry of Social and Family Development website. However, on May 8 2023, the Ministry published data on the number of families that have benefitted from the program since its inception. As of the end of 2022, 3,400 families have benefitted from HOPE (Ministry of Social and Family Development Website 2023).

graduate women themselves, particularly because it reproduced 'traditional' constructions of gender roles (Lyons-Lee 1998). The resistance towards Lee's brand of positive eugenics culminated in the formation of the Association of Women for Action and Research (AWARE) in 1985. AWARE sought to campaign for gender equality in Singapore society based on 'research and a thorough understanding of the issues' (AWARE website).

Yet such instances of organized resistance against biological citizenship, where citizens organize to change state defined meanings tied to the body, are few and far between in Singapore's history. This is especially true in the realm of health and medicine, where an added layer of experts is present on top of existing authoritarian political structure which seeks to curtail activism and political organizing (Chua and Hildebrandt 2014). In contrast to the case of self-fashioned 'lay experts' in Steven Epstein's (1995) study of HIV/AIDS activism in the United States for instance, the very sparse literature on disease and health activism in Singapore has characterized collective action as being nonconfrontational and severely constrained in their ability to effect change. Chua and Hildebrandt's (2014) study on HIV/AIDS advocacy groups in Singapore for instance, point the landscape of formal and informal rules that constrain collective organization and action. Thus, while the organizations in the study managed to raise the profile of HIV/AIDS as a public health issue, they were not able to subvert the state's brand of biological citizenship that rests on heterosexual reproductive norms.

That said, there has been some pushback to the racialized narratives related to diabetes. Experts for instance, have questioned this racialized approach to handling a public health crisis. In a 2017 interview with news outlet Channel NewsAsia for instance,

Professor Chia Kee Seng, from the National University of Singapore school of public health explained that there is 'no need to focus solely on Malays and Indians', adding that because Singapore is becoming more culturally homogeneous, lifestyle matters more than genetics or ethnic food (National University of Singapore School of Public Health, September 2017). Another, more subtle instance of pushback against the relevance of racial meanings in the diabetes discourse can be found in the Citizen's Jury for the War on Diabetes report published in 2018. The Citizen's Jury, organized by the Ministry of Health and the Institute of Policy Studies in Singapore, is based on a deliberative engagement model which includes the voices of 76 Singaporean citizens in the 'co-creation and co-delivery' of solutions for issues such as the growth of diabetes in society ('War on Diabetes' Ministry of Health).

The citizen participants engaged with various experts over a period of 8 weeks, and conducted research to develop recommendations that were then shared with the ministry for implementation. Interestingly, the resulting report, a 60-page document, available to the public on the ministry of health webpage makes no mention of race or ethnicity in framing of the public health issue or the recommendations for implantation. The absence of ethnoracial language in what is purportedly a citizen involved (albeit 76 citizens) initiative stands in contrast to the narrative of risky, idle and risky minority bodies that we see in this paper. While not explicitly pushing back against state racialization of the diabetes issue, it certainly approximates what Chua and Hildebrandt (2014) point to be a form non-confrontational politics illustrated in their study. Granted, these examples of divergences from a racialized narrative of diabetes and are limited and don't necessarily represent a systematic analysis of resistance to biopolitics. Yet

they point to possibilities of de-racializing the diabetes knowledge that exist outside of state molded racial biopolitics, an area that certainly deserves further attention.

It is also worth pointing out that where the broader scholarship on biopolitics is concerned, this research presents a contrasting case to the expected trajectory of contemporary biopolitics. Where states are expected to employ individualized biopolitics in line with the precision medicine movement and the molecularization of life (see Rose 2001, 11), ideas on race, ethnicity and the nation have not only endured this transformation but as shown here, emerged as crucial components of biopolitical management in Singapore. Moreover, in spite the assertion that the ‘vitality of the species – the nation, the population, the race – is rarely the rationale and legitimation for compulsory interventions’ (Rose 2001, 6), my research demonstrates that racial biopolitics remains a crucial mode of governance and is entangled with the narrative of national vitality and survival, both key constituents of the postcolonial nation building paradigm in Singapore (Hill and Lian 2013). In this regard, this research builds on the work of scholars such as Aihwa Ong (2016), Shirley Sun (2016), Jennifer Liu (2017) and Wen-Ching Sung (2010) that examine the continued exercise of biopower over racial and ethnic groups in Asia.

Lastly, the implementation of a universal health financing requires a strong state health orientation (see Clancey 2018), and even then, the emergent insurantal imaginary only forms part of the broader biopolitics in Singapore. The linking of a national health insurance policy with racial categories is contingent upon the history of postcolonial racial formation in Singapore as well as state power. This provides us with a clue as to why racialized responsibility and accountability is absent in contexts such

as the United States or in some parts of Europe where health insurance is widespread. There is the case of South Indians in the United Kingdom who despite the absence of a national insurance program, have been figured as risky racial subjects in the discourse on diabetes (Keval 2015). While this is true, the meanings that emerge from the relationship between race and diabetes in that case have to do more with the development of genetics as part of culture-gene package that lends greater legitimacy to the racial lens through which diabetes is examined, rather than a broader language of racialized responsibility and accountability. Regardless, this chapter represents an important jumping off point in the study of the role of healthcare financing in shaping racial meaning.

Chapter 3, in part, has been submitted for publication of the material as it may appear in the journal *East Asian Science, Technology and Society*, Bin Khidzer, Mohammad, Taylor and Francis Online, 2024. The dissertation author was the primary researcher and sole author of this paper.

Chapter 4: The Making of a Public Health Crisis: War on Diabetes in Singapore

This chapter builds on the previous one by closely examining a public health phenomenon to demonstrate how a particular disease, type 2 diabetes, was made into the most important public health issue in Singapore beginning in 2016. The declaration of war against diabetes, made by Singapore's health minister Gan Kim Yong in a 2016 parliamentary session, did not emerge out of a vacuum. It was only made possible through the gradual expansion of the biomedical infrastructure in Singapore beginning in the 1980s stretching all the way to the 2000s. Well-developed 'surveillance medicine' (Armstrong 1995) instruments such as population health surveys, risk statistics and projections of disease prevalence allowed state actors to articulate broad claims regarding population health, thereby supporting their declaration of war.

Undoubtedly, the involvement of the Singapore Prime Minister Lee Hsien Loong in this public health issue raised the profile of diabetes at the national stage. In his 2017 National Day address, a year after the initial declaration of war was made by the health minister, Prime Minister Lee highlighted type 2 diabetes that become a great public health issue in the small nation and that Singapore has the second highest proportion of diabetics in the population behind the United States (National Day Rally 2017). For context, the national day address is a highly publicized, annual speech given by the serving prime minister and it very often covers important national issues such as health, the economy, as well as the government plans for the near-term future. For the 2017 version, Prime Minister Lee covered the topic of early childhood education, a 'smart

nation' plan and of course, the war on diabetes. The inclusion of an authoritative voice lends legitimacy to the claim of a public health problem driven by type 2 diabetes.

Yet, even with these conditions in place, the narrative of diabetes as contributing to a public health issue was not uncontested. The urgency and coherency of diabetes as a public health matter was in fact challenged by actors from outside and inside the public health system. While it is easy to dismiss challenges from outside of the biomedical field as being politically motivated, criticism from within the realm of public health hinted at the differences in how experts perceive the diabetes issue. This chapter takes a leaf out of the study of scientific controversy in STS (Bloor 1991), combining it with a social constructionist approach to studying social problems, to trace the ascendancy of type 2 diabetes into the national public health stage, amid a landscape of 'disease politics' (see Best 2012) that included other diseases such as cancer and cardiovascular disease competing for attention and resources.

The point of this analysis is not to determine whether experts were right or wrong in focusing on diabetes as the most pressing national public health issue. Rather, through employing the social constructionist lens, I wish to highlight how biomedical 'facts' became entangled with economic factors and institutional dynamics that led to the elevation type 2 diabetes into an urgent public health matter. By economic factors, I do not just mean the introduction of public health language and policies that push for techniques of self-management and care that minimize state expense on healthcare *ala* the neoliberal state (Brown and Baker 2012; Kenny 2015). Beyond this, I will present other ways in which the diabetes problem and the diabetic population in Singapore have

been 'economized' (Murphy 2017) or reimagined as resources under a regime of 'biocapital' (Sunder Rajan 2006).

Didier Fassin (2004) explains that public health discourse very often 'naturalizes its objects' (169) through the weaving of evidence into a medical phenomenon, rendering it unquestionably obvious. In the War on Diabetes, medical scientific facts about the disease are presented alongside population health figures that make diabetes a public health problem. Yet it is important to acknowledge that public health reality is constructed, invented even, and flesh out the terms that animate its existence in cultural and political discourse. To understand the contours of the public health issue, I will first describe the public health framing that is connected to the War on Diabetes, laying out the key events and actors that were deployed to construct diabetes as *the* public health problem in Singapore.

This portion of the chapter relies primarily on an analysis of content that includes news articles, speeches that were accessible online, and an oral history interview. For the news articles, I utilized the LexisNexis database, focusing on the search terms 'war', 'diabetes' AND 'Singapore', and also limiting my search to between 2016 and 2017. The reasoning behind this very tight time frame was straightforward. I wanted to reconstruct the dominant ways in which the War on Diabetes was presented to the population since its initial declaration in 2016 by the Minister of Health, and then later in 2017 when the Prime Minister of Singapore himself took up the issue. The reconstruction of the public health messaging on diabetes also involved a close analysis of the Prime Minister's speech from 2017. This speech was published by the Prime Minister's Office on YouTube and is publicly accessible. The oral history interview was

from a search on the National Archives Singapore database using the search term 'diabetes' but limited to a time frame between 2016 to the end of 2020. The purpose of searching the oral history archives was initially exploratory. I had expected to examine a range of reactions to the War on Diabetes (a social history approach) since the time that the War on Diabetes was declared but the search returned a total of 5 oral history interviews, only two of which were immediately relevant to the War on Diabetes. These two interviews were done with the same person over two sessions. Crucially however, these interviews represent an insider view of Singapore's public health system in its formative, post-independence leading to the War on Diabetes.

Having laid out the framing of the diabetes problem, I will then proceed to unpack the underlying premise of the diabetes problem by referring to a disease trends statistics from the Ministry of Health Singapore website, as well as an authoritative publication titled the Burden of Disease in Singapore, 1990-2017 (2019). Using data from these sources, I point to trends and patterns that run counter to the overall reasoning behind diabetes as an urgent public health problem. Lastly, I use interview data with key figures in the broader diabetes research landscape (refer to Table 2) ³¹ and publicly available policy documents published by the National Research Foundation

³¹ My contacts in Singapore introduced me to the dean of the Nanyang Technological University Medical School, Professor James Best, who also happened to have been on the National Diabetes Steering Committee, a group of government appointed experts who published the Diabetes Task Force Report. The rest of the contacts for the diabetes and public health 'expert' interviews were through snowball sampling. Professor Best for instance, introduced me to one of the faculty members working on the flagship large scale population epidemiological study Health for Life in Singapore (HELIOS), Professor Mary. Professor Mary then connected me with other scientists who have been involved in the War on Diabetes in various capacities. While I conducted 6 in depth interviews with scientists, I do not present all of the data in this chapter. The interview data form a small part of the overall discourse and framing of diabetes as a public health issue in Singapore.

of Singapore and the National Medical Research Council in Singapore I will present another aspect of the war on diabetes that figures diabetes as not just a public health ‘crisis’, but as an economic opportunity that leverages certain ‘facts’ regarding Singapore’s diverse ethnoracial population, as well as a phenomenon that shares its history and destiny with emergent scientific institutions and biographies in Singapore’s competitive biomedical landscape.

Table 2: Participant profile

Professor James Best	Medicine (Dean)
Professor Mary (pseudonym)	Medicine (Faculty)
Professor Patrick Tan	National Precision Medicine Program (Executive Director)
Professor Lee (pseudonym)	Public Health (Faculty), National Precision Medicine Program (Chief Medical Officer)
Professor Mark (pseudonym)	Public Health (Faculty)
Professor Peter (pseudonym)	Medicine (Faculty)

Diabetes becomes a problem?

Ivy Ng was in charge of Singhealth. There was a mix up of blood samples, for Hepatitis C. It was in the newspaper. They talked about this husband-and-wife pair. I don’t know which were the groups, lost their lives. So they quickly wanted to divert the attention of the Singapore public. Our wonderful minister for health, Gan Kim Yong, said

the worse disease you can have is diabetes. We have to mount intensive country wide, suddenly diabetes was the killer. It wasn't killing anybody you know what I mean? - Dr Shanta Christina Emmanuel. (Emmanuel January 2022)

This quote was taken from an oral history interview with a senior public health official in Singapore, conducted in 2020. A profile piece published in a College of Public Health and Occupational Physicians Newsletter issue 13 (Toh December 2018) describes Dr Shanta Christina Emmanuel as having been extensively involved in Singapore's public health system. Dr Emmanuel served as the Director of Research and Evaluation Department in the Ministry of Health (MOH) between 1986-1997, the Director of Family Health Service in the Ministry of Health from 1997-2000, the CEO of National Healthcare Group Polyclinics from 2000-2005. As discussed in previous chapters, Dr Emmanuel was also responsible for the modernizing of the public health system in Singapore through the institution of nationwide community health surveys beginning in 1992.

Dr Emmanuel's influence on Singapore's public health system since the 1980s has been nothing short of profound, and this makes her cynicism all the more interesting. Not that there was a shortage of skepticism and questions surrounding the whole war on diabetes effort. The response to the Prime Minister's war on diabetes announcement in the 2017 national day address was somewhat mixed. While the national newspapers and affiliated government offices were quick to echo the government's concerns regarding the growing prevalence of diabetes among Singaporeans, writers on alternative platforms such as The Online Citizen highlighted the 'banality' of the speech, lamenting the host of other problems the nation had that

were much more serious than diabetes (Lim 20 August 2017). A poll conducted by Yahoo news found that overall, 48% of Singaporeans were neutral about the speech, with 44% rating it positively and the remaining 8% rating it negatively (Yahoo News Singapore 21 August 2017).

Dr Emmanuel herself seems to have dismissed the severity of the diabetes issue although she was in fact referring to the initial declaration made by the minister of health, Gan Kim Yong, in 2016 (before a 're-declaration' by Prime Minister Lee in 2017). As reflected in the quote above, the diabetes issue that was raised in 2016 was in fact a way to turn the public's attention away from another, more serious public health crisis: the hepatitis C outbreak in the Singapore General Hospital which had led to the death of 8 people over the course of 2015. The main issue here wasn't just the deaths, which rarely occur in Singapore's much vaunted healthcare system. Rather, it was the lapses in infection control, as well as the very slow response to the incident which had led to avoidable deaths that attracted criticism (Khalik 19 January 2016). The public health episode also happened under the watch of Professor Ivy Ng, CEO of the SingHealth Group who oversaw the operations of the Singapore General Hospital. Professor Ng also happened to be the wife of Singapore's then Minister for Defense, Ng Eng Hen.

What is implied by Dr Emmanuel in her quote is that the whole hepatitis C scandal involved an intriguing cast of powerful political actors and that somehow, the health minister Gan Kim Yong was dragged in to declare diabetes as a pressing issue during a parliamentary session in April 2016 as a way to distract the Singapore public from what can only be described as a public health scandal. Diabetes itself, according to Dr Emmanuel (who is also worth mentioning, a specialist in chronic disease), '*wasn't*

killing anybody'. The point of bringing Dr Emmanuel's quote into the mix here isn't to indulge in conspiracies, although the fact that Dr Emmanuel, a seasoned public health official is questioning the urgency of the issue should be concerning. Rather, the quote presents an invitation to explore the War on Diabetes as a sociological issue, other than it being just a medical and public health fact that lends itself to the various forms of government policies and interventions.

In this regard, it is important to begin with the premise that the War on Diabetes, needed to be *made* into an issue and this construction of a public health problem involved an assemblage of actors, institutions, technologies and ideas. This chapter therefore considers the social constructionist approach to understanding the War on Diabetes that was first declared in 2016. Taking this perspective, I ask how was it that diabetes was made into an urgent and crucially, *coherent* public health issue? What were some of the technologies that were mobilized to build consensus surrounding diabetes as a national issue? What were the social, political, economic and technoscientific conditions that allowed for the emergence of diabetes as a public health issue? In asking these questions, I engage with three, interconnected areas of scholarship. The first is the subfield of medical sociology that deals with the social construction of medical problems. The second related field is the social construction of scientific knowledge, attending to how biomedical categories and facts are constructed. The third area I draw from is the social history of medicine, paying close attention to the Cultural meanings produced in medicine and how it impacts perceptions on race.

A War Declared: The Social Construction of Diabetes as a Public Health Issue

If we look at the sociological tradition examining the construction of deviance and social problems, 'problems' are never taken as a given. In fact, a social problem requires constant tending. With claims that are very often pushed by moral entrepreneurs to remain socially relevant (Becker 1963). This same dynamic exists in the world of medicine too; medical sociologists point to how medical knowledge can be deployed as a powerful tool by experts to exert control over individuals, groups and populations (Conrad 2002; Friedson 1988; Zola 1972). Just as categories serve an important function in the delineation normalcy within society, diagnoses made by medical experts (through the deployment of medical knowledge and technologies) too function as a label that effectively render individuals as diseased, therefore opening them up to expert intervention and control (Brown 1995).

The boundaries, thresholds and limits for what constitutes as disease or medical condition are not static either. Certain human experiences and behaviors that did not fall under the purview of medical expertise can become 'medicalized'; what this means is that these conditions are now 'defined, experienced, and treated as medical conditions' (Barker 2010, 210). The advent of biomedicine and in particular, genomic medicine in the 21st century has seen the expansion of the medical gaze beyond the clinic and population based 'surveillance medicine' (Armstrong 1995) to create a new class of 'patients in waiting' (Timmermans and Buchbinder 2010), denoting individuals with genetic markers for a disease, but have yet to present symptoms.

From a social constructionist perspective then, the expansion of the medical gaze to include an ever-growing number of experiences and behaviors is anything but a

mere consequence of advancements in medical knowledge and diagnostics. The jurisdiction of medicine and medical expertise is shaped by what Peter Conrad (2005) terms the 'engines' of medicalization that include factors such as the growth of professional medicine (Starr 1978; Friedson 1988), biomedicine and its relationship with capitalist growth (Sunder Rajan 2006; Clarke et al. 2003), the rise of patient consumerism (Timmermans & Oh 2010) and the pharmaceutical industry (Dumit 2012). In other words, the *framing* of a particular disease as a public health issue needs to be located within an assemblage of actors, institutions, technologies and ideas.

The same way that an assemblage of actors, institutions, technologies and ideas can bring a condition to light, it may also suppress conditions affecting certain groups and here, a close examination of the history of medicine, particularly as it intersects with race, is very relevant to narrative of the War on Diabetes in Singapore. Keith Wailoo (2001) for instance, describes how sickle cell disease which primarily affected African Americans remained a neglected condition until the civil rights movement brought greater awareness of the 'Negro disease' and black pain. Similarly, Arleen Tuchman (2020) interrogates the claims of low rates of diabetes (and immunity) among African Americans in the early 20th century which belied the lack of reliable statistics on African American health then, as well as the limited contact between the Black population and a predominantly White physician class (Tuchman 2020, 71). The absence of a problem then is also shaped by factors beyond medical diagnoses.

Following the same thread, we need to be cognizant of the fact that just as the framing of medical and public health issues enable certain kinds of interventions, it also limits the ways in which the problem can be looked at and this aspect of framing forms

such an important part of my overarching criticism against the War on Diabetes in Singapore. An oft repeated ‘truth’ in public health messages (and this was also highlighted by the Prime Minister himself during the 2017 national day address) is that type 2 diabetes is not *just* a genetic condition. While genetics is indeed a contributing factor, type 2 diabetes is very much a lifestyle disease that can be managed and even eradicated through making behavioral changes such as going for regular health screenings, making adjustments to diet and lastly regular exercise. In short, yes genetics play a part but you also need to change how you live your life.

If we look at how the War on Diabetes is described in the media since 2016, we see another mode of framing the issue that unsurprisingly overlaps with Singapore’s racialized system. In the screen grab (figure 1), descriptive statistics for diabetes prevalence for those aged 60 and above is broken down into the three major racial groups in Singapore – the Chinese, Malays and Indians. The Prime Minister also highlighted the severity of the problem among the Malay and Indian groups, calling it a health crisis (25:08). 5 in 10 Malays above 60 have or will have diabetes and more than half of Indians at that same age group have or are expected to have type 2 diabetes. In a separate Malay language address, the Prime Minister went as far as highlighting the health harming nature of Malay foods which therefore requires significant modifications both in terms of their recipe and consumption patterns:

I know Malay food is tasty because it contains *lemak* (fats). Unfortunately, the richness comes from coconut milk and sugar. I myself love dodol... I also love ondeh-ondeh. But my doctor would surely scold me if I eat too much and would tell me to eat less (National Day Address in Malay 5:14, see also figure 4).

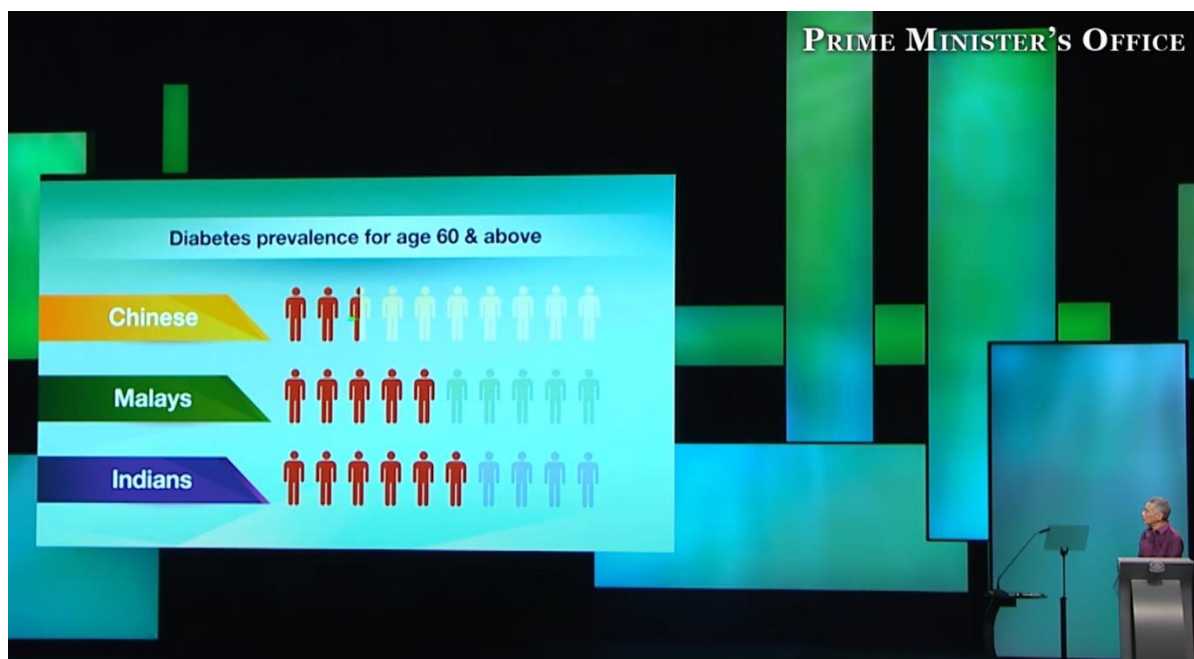


Figure 3: Screen grab from the 2017 National Day Address in English

There were other ways in which diabetes was framed as an urgent public health issue too. Aside from prevalence among racial groups, the Prime Minister stressed the ‘invisible’ nature of the disease, particularly in its early stages where there aren’t that many symptoms. A person would not know that they had diabetes until more serious symptoms arise. The impact of diabetes is also ‘invisible’ in another way. Prime Minister Lee explained that while diabetes doesn’t figure among the top causes of death in Singapore, ‘many common causes of death can be traced to diabetes, heart attack, stroke, kidney failure, underlying cause, predisposing them, diabetes’ (25:46)³². Moreover, while Singapore ranks among the highest in the world in terms of life expectancy (average of 82 years old), it also has an alarmingly high number of years of ill health (8 years on average), with diabetes largely contributing to the years of ill health

³² Other terms used to describe the invisible state of diabetes in Singapore are ‘silent killer’ and ‘apathy’ (Wong 25 August 2017).

in old age. The overall high life expectancy in Singapore therefore 'hides' the condition of ill health that plague most Singaporeans in old age.

The concern with the 'invisibility' of diabetes in the population is not just meant to highlight the potentially debilitating effects the disease would have on one's body, or to encourage Singaporeans to be more proactive in monitoring one's health curb the onset of diabetes. Underlying this concern with the spread of diabetes is the economic cost of diabetes to the nation and this is especially pertinent given that firstly, Singapore counts its population as an important economic resource (which in turn requires the maintenance of healthy, productive bodies) and secondly, the healthcare system in Singapore which is made up of a combination of government subsidies, forced savings and a national health insurance system would be heavily burdened by a large proportion of the population having complications from diabetes.

This economic concern did not come up explicitly in Prime Minister Lee's 2017 national day address, which focused mainly on the extent of the diabetes problem within the ethnic racial communities and the behavioral solutions to tackle the health crisis. It was however, front and center in initial declaration made by the health minister in 2016. In his address to the parliament where he first declared war against diabetes, Health Minister Gan Kim Yong, citing data from a study conducted by the National University of Singapore and the University of Southern California stated that diabetes is already

costing Singapore a billion (Singapore) dollars a year, and this figure is set to increase to 2.5 billion in the year 2050³³ (Khalik 13 April 2016).



Figure 4: Screen grab from the 2017 National Day Address in Malay

Altogether then, these ‘facts’ form a narrative of a public health problem that justifies the declaration of a ‘war’ against diabetes in Singapore. The deployment of medical knowledge relating to diabetes, the weaving of a medical problem into forms that are easily identifiable to the broader public (ageing society and particularly race), as well as the cost it imposes on the nation are crucial in both solidifying the diabetes ‘problem’, and in convincing the public of the severity of the issue at the present and in the coming years. State actors articulates a future where a growing proportion of sickly citizen bodies could possibly cripple the healthcare system and the national economy. Diabetes, specifically type 2 diabetes then becomes intertwined with the destiny and

³³ 42 percent of anticipated cost will come from medical treatment while the rest will come from indirect productivity related losses.

survival of the nation, much like how the maintenance of racial harmony in Singapore's multiethnic population is tied to its future (Chua 1996; Lim et al. 2014).

Crucially, the War on Diabetes is framed as a problem that requires behavioral and cultural modifications: eat less, take the stairs instead of an elevator, switch to brown rice instead of white rice, make Malay food less 'lemak' or fatty. The source of this public health problem is the individual and to a certain extent, the ethnoracial communities in Singapore, given that the problem presents itself in higher percentages in the Malay and Indian communities. This individualized framing reflects a prevalent neoliberal morality that characterizes the relationship between citizens, as well as between citizens and the state in Singapore³⁴ (Teo 2012). What this essentially means is a mode of governance which is hands-off, and that emphasizes individual responsibility for one's success or failures, per the logic of the market. The condition of neoliberal morality therefore stresses personal responsibility in the maintenance of one's health, in order to maintain the health of the nation.

Here, morality forms an awkward partnership with communitarianism to invoke a sense of responsibility toward the collective; in this sense, neoliberal morality shapes what it means to be a good citizen subject (Chua 1996; Teo 2012). In order to minimize the possibility of encountering the bleak future of a nation burdened with diabetic care, the state encourages the responsible practice of self-care and management. Thus, the war on diabetes does not just reflect a kind of moral panic to induce action against

³⁴ Teo (2012) and others have argued that such an approach requires a high degree of compliance from the citizen body and this is a consequence of the kind of social engineering policies that emphasize personal responsibility and responsibility to the broader community/nation, coupled with the Singapore government's economic policies that include low corporate taxes and the privatization of public goods.

perpetrators, as is often the case in episodes of moral panic. Woven within this message of war is a neoliberal morality that is especially unique to type 2 diabetes and other metabolic illnesses understood to have been caused by a combination of genetic and lifestyle factors. In the case of Singaporean Malays and Indians, these are also groups that have in addition to the factors above, 'risky cultures' (see also Keval 2015).

On the surface, these recommendations seem innocuous, logical even. However, such a framing of type 2 diabetes essentially ignores existing research the social determinants of health and how they contribute to the prevention of diabetes as well as its complications. Precarious employment, access to recreational time and space, food environment, built environment and poverty have all been shown to be correlated with the incidence and prevalence of type 2 diabetes in populations (Williams and Buttfield 2016; den Braver et al. 2018). But of course, these factors were barely, if at all mentioned in the high-profile pronouncements. Irving Zola (1972), among others, argues that the predominant framing of problems through the medical and biomedical lens could potentially depoliticize social issues and that in 'locating the source and treatment of problems in an individual, other levels of intervention are effectively closed' (ibid 500).

What is important to note here is that this overarching narrative of a public health crisis is presented as one that is coherent and free of any kinds of contradictions. The authority of politicians, particularly a self-avowed 'healthy' politician such as the Prime Minister who in many ways, serves as the barometer for health in Singapore (see figure 3) certainly lends credibility to the claims of a health crisis and the recommendations. Population health data, particularly statistical projections of the prevalence of diabetes

in Singapore, and the anticipated costs of shouldering this health issue too contributed to the reality of a social and public health problem. Yet there are detractors, such as Dr Emmanuel, that throw this narrative of crisis into doubt, and in country such as Singapore where consensus forms such an important component of governance (Chua 1995), instances that trouble state narratives (even if they have not been elevated to a legal case as is often the case in the United States) afford us a peek into what goes behind the black box of public health.

Indeed, Dr Emmanuel's point on mortality and how diabetes 'wasn't killing anyone' raises an interesting question: if not mortality and deaths, what makes a disease deserving of a public health crisis? In his address, the Prime Minister took pains to couple diabetes to 'ill health', particularly during old age. What does ill health mean here? What kinds of ideas, metrics and technologies are being drawn to construct diabetes as a public health crisis? How do 'cost' and 'burden', two concepts that were raised by the health minister in the initial (2016) declaration of war against diabetes, figure in the construction of a public health crisis? In the coming section, I will continue this discussion on the construction of a public health problem by analyzing closely, the mundane technologies that constitute it, while exploring the different aspects of the economics of diabetes that are tied to the war on diabetes.

Is your lifestyle **healthier** than PM Lee's? 🍚

Prime Minister Lee Hsien Loong shared his personal tips for healthy living at the National Day Rally on Sunday (Aug 20). Take our quiz and find out how you match up to him.

PUBLISHED: AUG 20, 2017



1/7

How much time do you spend walking a day? 🚶

- ☐ 40 minutes
- ☒ 1 hour or more
- ☐ 10 minutes: stroll to the bus stop

PM Lee brisk walks for 40 minutes every morning. The recommendation is 10,000 steps a day. Walking for 10 minutes is the equivalent of 1,000 steps, while an hour of playing badminton or soccer is equivalent to about 10,350 steps. Taking 7,500 to 10,000 steps daily can help lower blood pressure and blood cholesterol levels, according to HPB. It can also lead to improved glucose control and reduce the risk of diabetes and other chronic diseases.



2/7

When you want to go to a higher floor, what do you do? 🏢

- ☐ Take the stairs
- ☒ Take the lift

PM Lee climbs the stairs at his office instead of taking the lift. Just five minutes of walking upstairs means he burns off 23 calories. Doing so thrice a day earns him the calories of half a scoop of delicious ice cream.



3/7

What rice do you usually eat? 🍚

- ☐ White rice
- ☐ Brown rice
- ☐ Mixed rice

Figure 5: The Prime Minister as Barometer of Health (Pazos et al. 20 August 2017)

Demystifying the Numbers Behind the War Machine

How does a chronic disease such as type 2 disease become a public health crisis? Is it because as the health minister Gan Kim Yong suggests, the growing cost of diabetes to the national economy would be too large to bear? Or does the tragedy of living out one's life in ill health as Prime Minister Lee pointed out, matter more? What about deaths or mortality rates? Was diabetes really not killing anyone as Dr Emmanuel claimed? What is it about diabetes as a disease that induces the kind of panic leading to a declaration of war? This section examines the available evidence on disease burden in Singapore to make sense of the reasoning behind the War on Diabetes put forth by state actors. Beyond a close examination of a disease morbidity and mortality trends report published by the Ministry of Health, I will also analyze other policy documents, particularly the diabetes task force report. This data will also be complemented with interview responses from key actors who were involved in the diabetes task force as well as the burden of diabetes study cited by state actors.

We begin by examining data on disease burden from the Ministry of Health website. The data from this website is meant to provide a general overview of how prevalent diseases are in the population, as well as how specific diseases contribute to the disability-adjusted life years or DALY metric. If we refer to the disease burden table over a period of 15 years (figure 6), we see that the prevalence of diabetes among adults aged 18-69 compared to hyperlipidemia (high cholesterol), hypertension, daily smoking and obesity is the lowest between 2010-2017, the period leading to the declaration of war in 2016. In fact, in the same time frame, the prevalence of hyperlipidemia and hypertension within the population is more than double compared to

diabetes. On the surface then, diabetes doesn't seem to be the most urgent of problems, although its prevalence has certainly increased since 1992.

Despite the comparatively low prevalence, one might think that diabetes was chosen because it leads to other diseases and complications, a kind of 'gateway' disease. This was indeed a key reasoning adopted within the War on Diabetes narrative. The Prime Minister mentioned in his 2017 address that even though diabetes was not a major contributor of deaths, it leads to other conditions such as kidney disease, heart disease and stroke. An interview with a faculty and medical researcher from the National University of Singapore yielded the same view. When asked why it was that diabetes became the face of public health, he said the following:

I think that the ministry was already looking at chronic diseases as being of concern in Singapore, as countries age, there is a transition from infectious diseases to non-communicable diseases (NCD), we still have infectious disease burden but most of that burden comes from NCDs. So, they were looking for something to act as a rallying point and having diabetes as a target is a good one because it means all of the interventions that would impact diabetes would also impact like risk of hypertension, heart attack and so on so forth. (Professor Mark, interview)

The issue with such an explanation is that it is equally valid for both hypertension and hyperlipidemia, the other two diseases with higher levels of prevalence also highlighted in figure 6. According to a World Health Organization fact sheet (Hypertension World Health Organization 2023), if prolonged hypertension isn't treated,

it may lead to kidney disease, heart disease and stroke. For hyperlipidemia, the American Heart Association website states that if left uncontrolled, it may lead to other conditions such as heart disease and stroke.

Perhaps the answer for why diabetes was singled out as the most important public health problem would be better explained if we revisit the Prime Minister's point about years lived in ill health as a result of diabetes. Data from 'The Burden of Disease in Singapore, 1990-2017' (henceforth the burden of disease) report published in 2019 by the University of Washington and the Ministry of Health Singapore showed that although Singaporeans have generally become healthier over the second half of the 20th century (because of an improvement in the years of life lost or YLL statistic), the years lived with disability or YLD statistic has remained constant. This tells us that although people in Singapore are living longer, they have been 'experiencing similar rates of non-fatal

DISEASE BURDEN						
	1992	1998	2004	2010	2013	2017
Prevalence among adults aged 18 to 69 years^{1,2} (%)						
• Hyperlipidaemia	na	na	na	25.2	na	33.6
• Hypertension	16.1	21.5	20.1	18.9	na	21.5
• Diabetes	7.3	7.4	7.0	8.3	na	8.6
• Obesity	5.1	6.0	6.9	10.8	8.6	8.7
• Daily Smoking	18.3	15.2	12.6	14.3	13.3	12.0
Definitions:						
Hyperlipidaemia: LDL-Cholesterol ≥ 4.1 mmol/l						
Hypertension: Blood pressure $\geq 140/90$ mmHg						
Diabetes: Fasting plasma glucose ≥ 6.9 mmol/l						
Obesity: BMI ≥ 30 kg/m ²						
Daily Smoking: Smokes cigarettes at least once a day						
na - not available						

Figure 6: From MOH Disease burden (Disease Burden Ministry of Health Singapore):

health loss since 1990' (21). Essentially, what this means is that the rate at which people are living in ill health has increased in tandem with the rise in life expectancy.

If we dive deeper into the data from the report, we can see that the main contributing factors to the rates of YLL and YLD is not diabetes. Figure 7, taken out of the burden of disease report, shows the DALY distribution by causes³⁵. Figure 7 conveniently illustrates the proportion for which certain diseases contribute to 1 DALY, which is essentially the 'loss of the equivalent of one year of full health' (Disability-Adjusted Life Years World Health Organization). We can see here that cardiovascular diseases, cancers, musculoskeletal disorders and mental disorders are the 4 leading causes of DALY in 2017 and also in 1990. Diabetes and kidney diseases is ranked 7th in 1990 and 8th in 2017. It seems that in terms of contributing to DALY, diabetes and kidney diseases has clearly dropped in importance between 1990 and 2017 (see figure 8).

The report also highlighted that the increase in the DALY statistic (46.2%) for diabetes was due to a rise in the prevalence of diabetes mellitus and chronic kidney disease. The report defines disease burden due to diabetes mellitus as caused by death due to diabetes and a prevalent case as someone who continues to be affected by diabetes (blood plasma glucose level higher than 7 mmol/L) and are receiving treatment. Prevalent cases also include those who have disabilities such as diabetic foot, amputation or vision loss due to diabetic retinopathy. Prevalent cases exclude

³⁵ The DALY for a disease or health condition represents the sum of the YLL and YLD caused by the disease or health condition.

cardiovascular diseases and kidney diseases resulting from diabetes (29). The report explained that for this particular DALY category,

‘Chronic kidney disease caused many more YLLs than YLDs, especially among Singaporeans aged 65 and older, Diabetes by contrast was much more likely to cause YLDs than deaths, and to do so earlier in life, starting in middle age and lasting for many years.’ (29)

The main concern here then, is the debilitating nature of the disease especially as it affects younger people, meaning that the burden of disease would have to be borne over a longer period. That said, the DALY for cardiovascular disease is still higher overall given that cardiovascular disease mainly affects older people, and with Singapore’s ageing population, this is where the source of the DALY statistic is coming from. Notably, when discussing DALY, the report only discusses cancers, cardiovascular diseases and finally diabetes and kidney diseases. The reasons for focusing only on cancers, cardiovascular diseases and diabetes and kidney diseases seems odd. Musculoskeletal disorders and mental disorders were omitted.

Figure 9 presents a zoomed in portion for diabetes and kidney disease. Here we see that the prevalent cases for diabetes have gone up since 1990 but started to dip around 2013. The DALYs statistic, which captures DALY cases affected by diabetes mellitus and chronic kidney disease, also reflect a similar trend (my sense is that the two graphs are shown because prevalence does not necessarily equate to DALY, one can have diabetes based on blood screening but no symptoms whatsoever). DALY cases due to diabetes in particular, seems to have gone down since 2005. The report

Distribution of total DALYs by cause, Singapore, both sexes, 2017

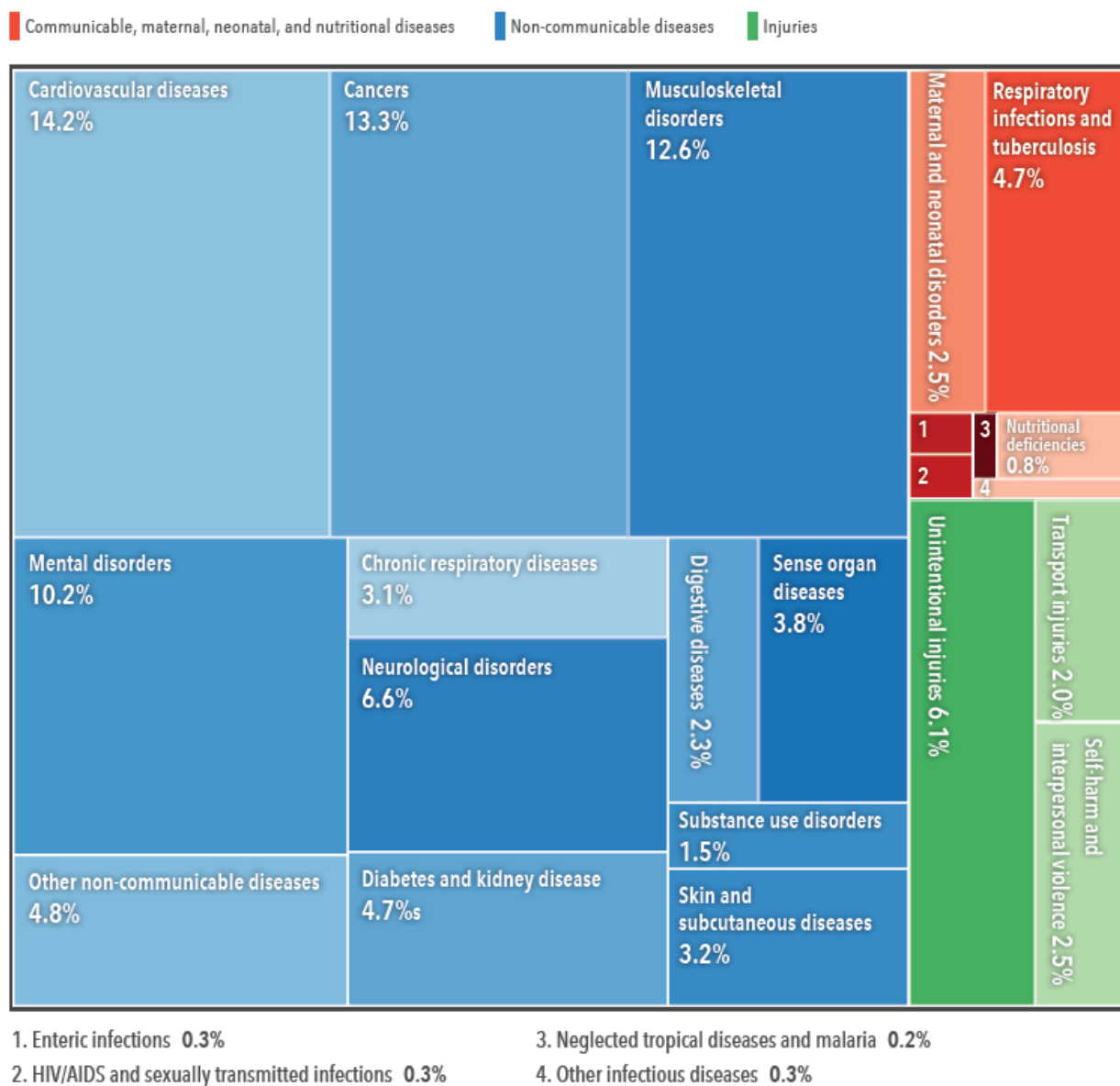


Figure 7: From the burden of disease report (23)

Leading causes of DALYs, Singapore, both sexes, 1990–2017

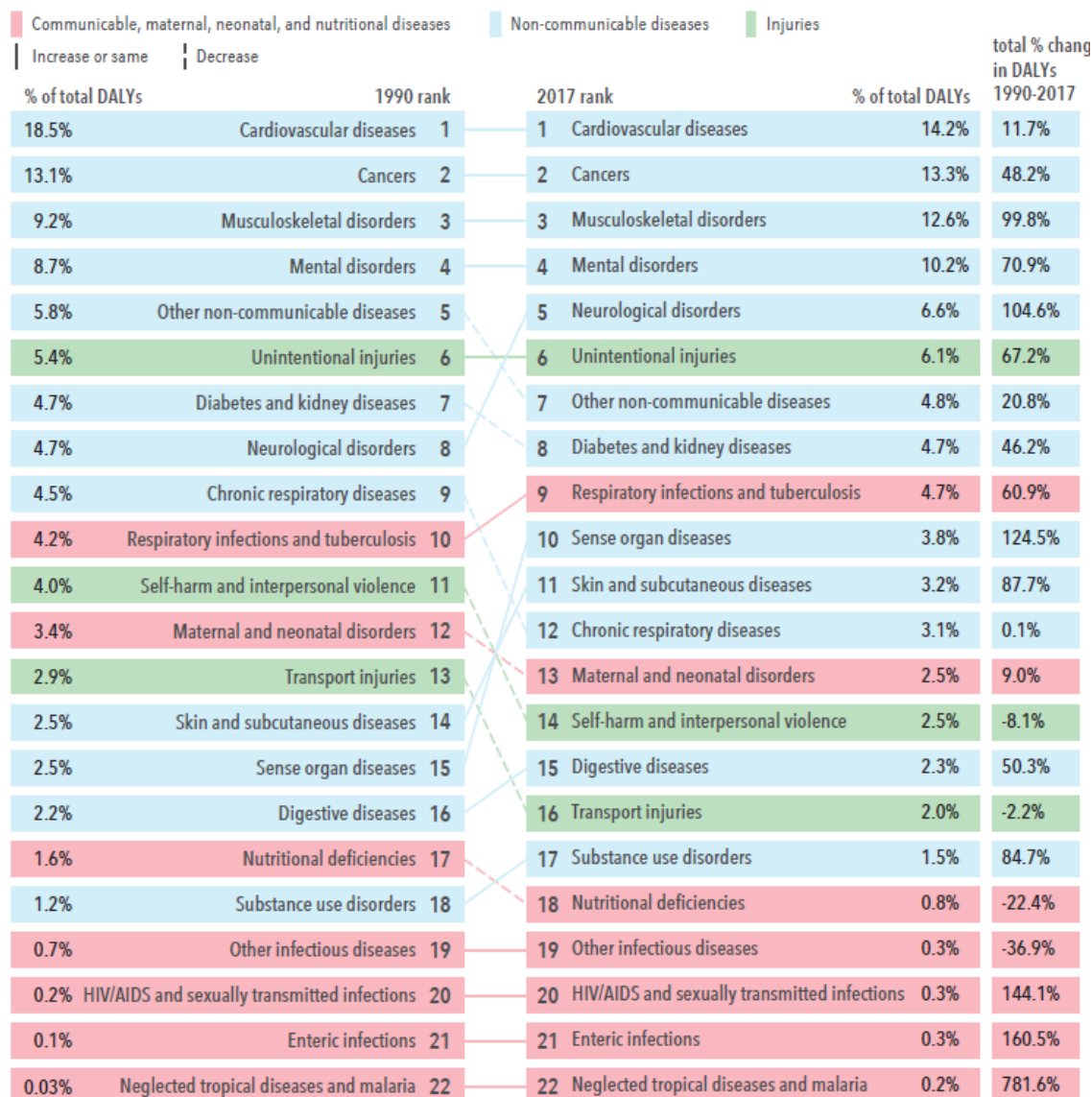


Figure 8: From the burden of disease report (24)

does not offer an explanation for these graph trends but it does seem to indicate a downward trend, very importantly for DALY in diabetes. So, the timing for the war on

diabetes and even the choice for diabetes seems a little odd when we look at the presented trends. Compared to other diseases, diabetes was not even the top 5 in terms of contributing to DALYs. Yet it somehow achieved an outsized public health attention in 2016.

Even if we dig into YLD, which is the years lost on disability, a pertinent measure for diabetes considering the public health message underlined the fact that more younger people are getting diabetes and diabetes resulted in living life in less than perfect health, the numbers do not seem to point to diabetes as the clear frontrunner for such an aggressive disease campaign (see figures 11 and 12). Perhaps the clue lies in the risk factor section of the report, which makes for an interesting read. The section begins with the following sentence:

‘Risk factors are potentially modifiable causes of disease and injury’ (44).

It becomes clear later on in the section that what is modifiable and what is in need of modification is behavioral and metabolic risk factors. The four main risk factors that contribute to DALYs are dietary risks, tobacco, high blood pressure and high blood sugar. This section also highlighted, towards the end that the ‘burden caused by dietary risks, for example, was primarily composed of cardiovascular diseases, followed by diabetes and kidney diseases and cancers for both male and female’. This is reflected in figure 12.

Prevalent cases (left) and number of DALYs (right) due to diabetes mellitus and chronic kidney disease, both sexes, Singapore, 1990–2017

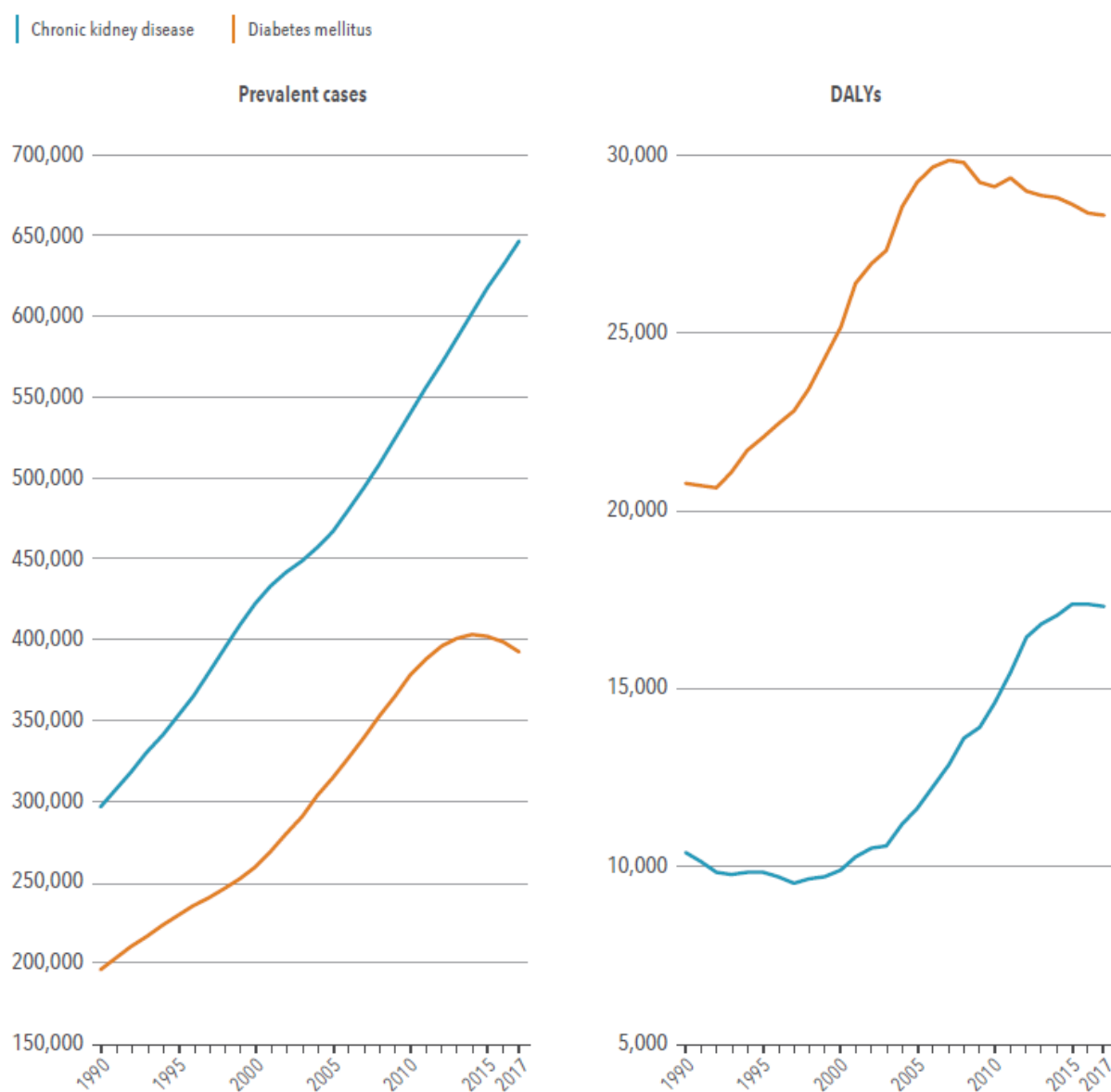


Figure 9: From the burden of disease report (30)

Distribution of total YLDs by cause, Singapore, both sexes, 2017

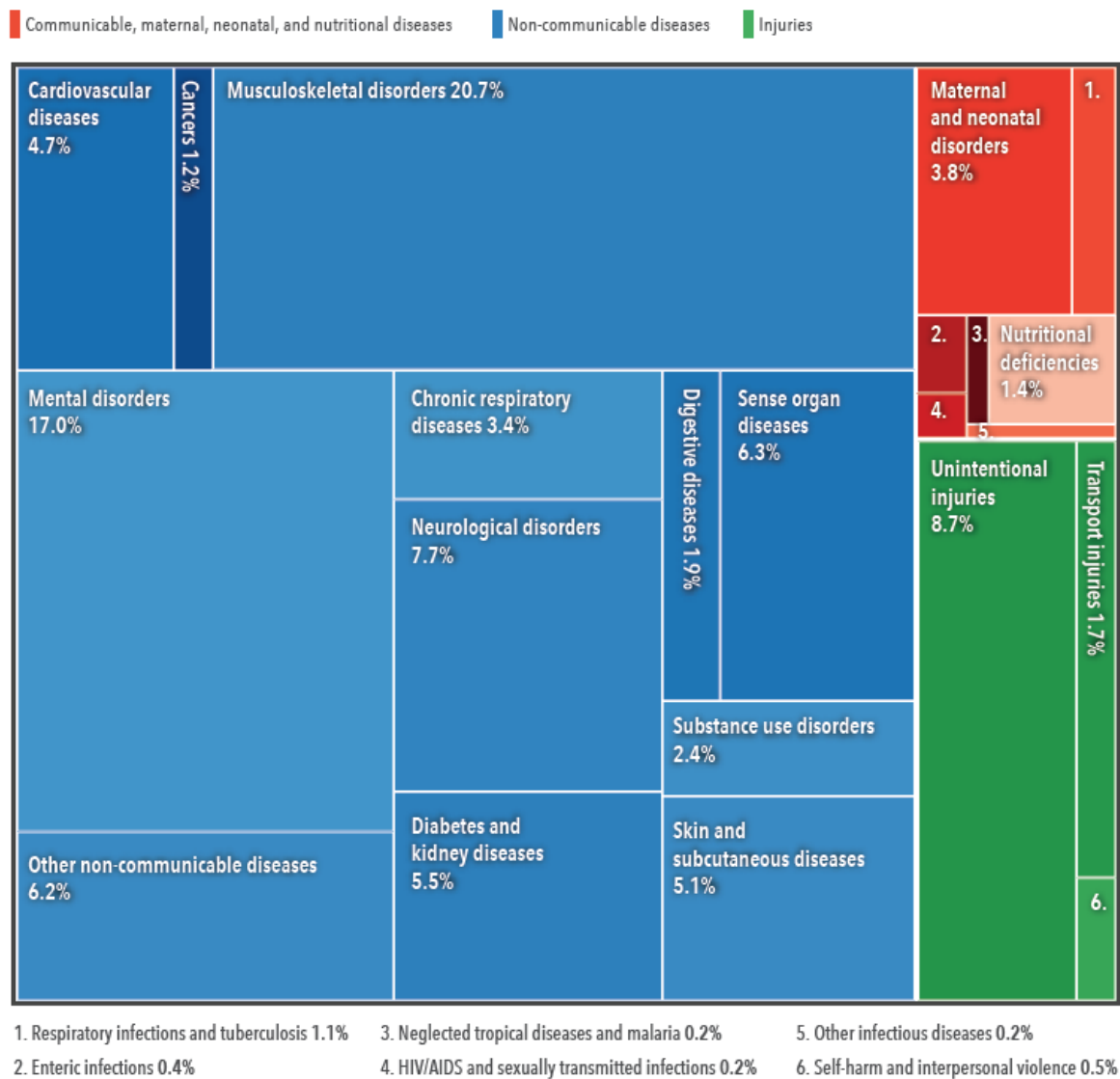


Figure 10: From the burden of disease report (37)

Leading causes of YLDs, Singapore, both sexes, 1990–2017

Communicable, maternal, neonatal, and nutritional diseases			Non-communicable diseases		Injuries	total % change in YLDs 1990-2017
Increase or same			Decrease			
% of total YLDs		1990 rank	2017 rank		% of total YLDs	
19.5%	Musculoskeletal disorders	1	1	Musculoskeletal disorders	20.7%	104.3%
19.1%	Mental disorders	2	2	Mental disorders	17.0%	71.0%
7.8%	Unintentional injuries	3	3	Unintentional injuries	8.7%	115.6%
7.5%	Neurological disorders	4	4	Neurological disorders	7.7%	97.2%
6.3%	Other non-communicable diseases	5	5	Sense organ diseases	6.3%	124.5%
5.4%	Sense organ diseases	6	6	Other non-communicable diseases	6.2%	87.4%
5.3%	Skin and subcutaneous diseases	7	7	Diabetes and kidney diseases	5.5%	105.6%
5.1%	Diabetes and kidney diseases	8	8	Skin and subcutaneous diseases	5.1%	86.5%
4.1%	Maternal and neonatal disorders	9	9	Cardiovascular diseases	4.7%	134.1%
3.8%	Cardiovascular diseases	10	10	Maternal and neonatal disorders	3.8%	78.3%
3.7%	Chronic respiratory diseases	11	11	Chronic respiratory diseases	3.4%	74.3%
3.4%	Nutritional deficiencies	12	12	Substance use disorders	2.4%	79.6%
2.5%	Substance use disorders	13	13	Digestive diseases	1.9%	121.0%
1.6%	Digestive diseases	14	14	Transport injuries	1.7%	109.0%
1.6%	Transport injuries	15	15	Nutritional deficiencies	1.4%	-22.3%
1.3%	Respiratory infections and tuberculosis	16	16	Cancers	1.2%	223.1%
0.7%	Cancers	17	17	Respiratory infections and tuberculosis	1.1%	62.1%
0.5%	Self-harm and interpersonal violence	18	18	Self-harm and interpersonal violence	0.5%	82.9%
0.3%	Other infectious diseases	19	19	Enteric infections	0.4%	166.8%
0.3%	Enteric infections	20	20	Neglected tropical diseases and malaria	0.2%	1,093.6%
0.2%	HIV/AIDS and sexually transmitted infections	21	21	HIV/AIDS and sexually transmitted infections	0.2%	123.3%
0.04%	Neglected tropical diseases and malaria	22	22	Other infectious diseases	0.2%	32.3%

Figure 11: From the burden of disease report (38)

Paying attention to the risk factors certainly paints a more complex picture of what the urgent public health problem is. In terms of designing public health interventions to reduce risk factors, cardiovascular diseases, and diabetes and kidney

diseases rank ahead of other diseases, although the former is still significantly ahead³⁶. There are other official public health platforms that similarly trouble the status of diabetes as a leading public health issue. For example, the National Registry of Diseases Office, set up in 2001, manages 4 registries for common diseases – 1) cancer, chronic kidney failure, stroke and heart attack. Here again, we see that while there are records for chronic kidney failure, there are no records for diabetes (although chronic kidney failure is mostly caused by diabetes and high blood pressure, and high blood pressure can be affected by diabetes).

This section of the chapter complicates the coherent narrative of the War on Diabetes that is supposedly driven by medical facts and data. I demonstrate, using publicly available data, how the claims made in the public health discourse in support of the War on Diabetes were not necessarily founded on ‘hard’, incontrovertible evidence. Regardless, type 2 diabetes still became the face of public health in Singapore. The coming sections will explore social, political and economic facets that shape the emergence of type 2 diabetes as a national issue. There is however, another point worth highlighting from these claims and this concerns the *type* of data and what they represent.

³⁶ It is important to also note here that socio economic status, precarious employment (Williams and Buttfield 2016), food environment (Mezuk, Li, Rice, Sundquist and Sundquist 2016), and urban built environment (Anza-Ramirez, C., Lazo, M., Zafra-Tanaka, J.H. et al 2022), all very important considerations for metabolic diseases, do not figure as risk factors or fall under the category of environment.

Breakdown of DALYs attributable to specific risk factors, Singapore, males versus females, 2017

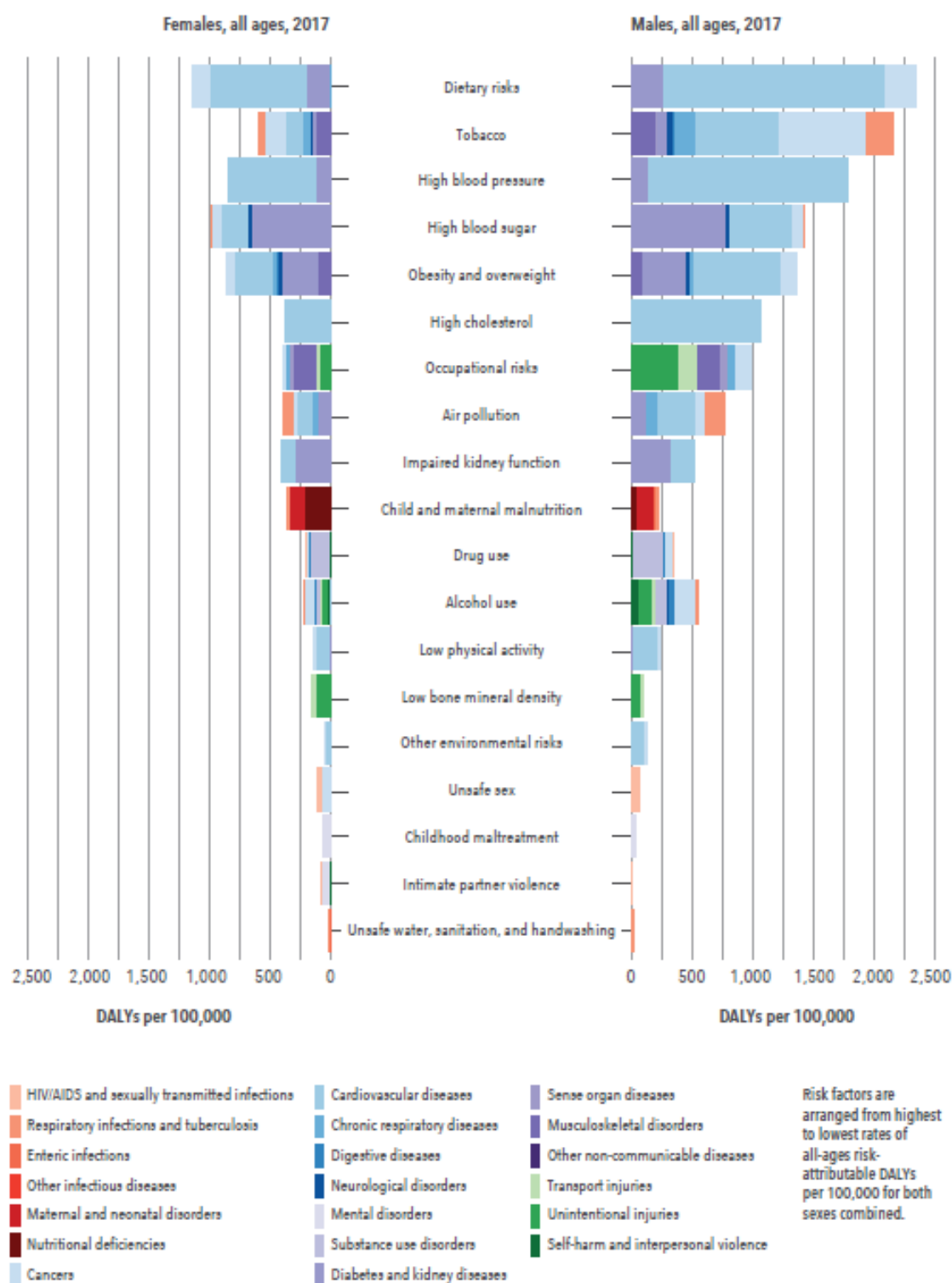


Figure 12: From the burden of disease report (46)

The broad use of the DALY metric and its attendant notion of loss of healthy years, represents a historical shift in how disease burden is both measured and viewed. According to Katherine Kenny (2015), the DALY metric and descriptive statistics capture 'loss' of healthy life from death and disability (which the Prime Minister noted in his speech as well) that reflects the priorities of a neoliberal state. Kenny (2015) explains that the DALY metric *economizes* life by 'imagining health as a form of human capital' (11), thereby allowing for a more effective cost benefit analyses of solutions in public health, as well as the 'investment' in speculative health futures made legible through statistical projections of disease burdens (recall the health minister's utilization of a study to make his point on the seriousness of diabetes during a 2016 parliamentary session). The coming section expands on this point on economization by examining another facet of 'human capital' that is related to diabetes and the Singapore population.

Before the War: Opportunity in Crisis

So how then did diabetes become a disambiguated concern in public health? What contributed to its status as the number one health issue in Singapore? There are a few ways in which this was achieved and the best way to understand the public health framing of diabetes would be to examine to a key document which preceded the declaration of war in 2016: the Diabetes Task Force (DTF) report (Coffman et al. 2015). This report was overseen by two separate but connected government entities – the Ministry of Health and the National Medical Research Council³⁷ - and was authored by a

³⁷ The National Medical Research Council was established in 1994. According to its webpage, it 'oversees the development and advancement of medical research in Singapore. It provides research funds to healthcare institutions, awards competitive

panel of experts christened the Diabetes Taskforce, formed in October 2015³⁸. It is also important to note that the Diabetes Taskforce and the DTF report were both subsumed under the long-term national economic growth strategy called the Research, Innovation and Enterprise (RIE) plan, which involves another government agency – the Ministry of Trade and Industry, arguably the most important of all of the state bodies involved here.

In the 2015 and 2020 iterations of the RIE plan (the most current plan is the RIE 2025 plan), the Health and Biomedical Sciences (HBMS) was identified as a key growth sector and held a vision to ‘be a leading center that advances human health and wellness’, and to create ‘economic value for Singapore and Singaporeans, through the pursuit of excellence in research and its applications’ (HBMS Disease Taskforce Reports). To achieve this, the NMRC highlighted 5 ‘therapeutic areas’, which are essentially 5 diseases which can benefit from ‘research roadmaps’. These 5 diseases are 1) cancers 2) cardiovascular diseases 3) diabetes 4) infectious diseases 5) neurological and sense disorders.

This list of 5 diseases and their embeddedness within the national objectives of economic growth is especially important in helping us make sense of the ambivalence behind the choice of diabetes as the face of public health, as presented in the previous section. Taking a closer look at the DTF report, the first thing that becomes clear is that the tone of the report is somewhat less alarmist compared to the public health narrative. While the report presents projections on the prevalence of diabetes similar to the

research funds for individual projects and is responsible for the development of clinician-scientists through awards and fellowships’.

³⁸ This taskforce replaced the now defunct National Steering Committee on Diabetes.

narrative found in the War on Diabetes, the statistical projections were linked to notions of healthcare burden and more importantly, opportunity. For example, while there was an acknowledgement of the burden of disease in Singapore and how this is expected to grow, the same page (1) of the summary report also presented a projection regarding the number of people that are expected to live with diabetes In Asia. In fact, the background section begins with the following statement:

Type 2 diabetes (T2D) is reaching epidemic proportions in Asia. In 2013, the number of people living with diabetes in Asia-Pacific was 210 million (M) and by 2035, the number is expected to grow to 325M. The percentage of undiagnosed cases in Southeast Asia (49%) is higher than the global average (46%). (Coffman et al. 2015, 1)

If we read the DTF report as an *economic plan* as opposed to it merely being a public health document, the deterioration of health in populations can also be seen as *opportunities* for economic development and growth. The authors of the DTF report analyzed the various types of research and initiatives that have been conducted around the world, and identified a key gap which Singapore should be able to fill given its profile. This was in developing a model of care for diabetes that minimizes healthcare costs, and is sensitive to the context of an ageing population. The DTF report underlined the following advantage that Singapore holds:

...Singapore is uniquely poised to compete effectively in this therapeutic area, by taking advantage of some of the highest complication rates in the world, and a

population which represents (in some form or another), up to two thirds of the worlds' population. (Coffman et al. 2015, 3)

The language of opportunity could not have been expressed more clearly here³⁹. The prevalence of complications and the presumably diverse ethnoracial population that represents a large portion of the world population here are figured as resources. This point on Asian populations and Singapore's supposed Asian representation is key to understanding the construction of diabetes as a public health problem in Singapore. This assertion is not present in the reports for the 4 other diseases which the NMRC highlighted as having potential 'value' for the national economy. Aside from being a burden to the healthcare system, the presence and prevalence of sick bodies also represent an opportunity for research that could potentially benefit people beyond the boundaries of the island nation. This convergence between science, economy and biopolitics has been covered by STS scholars. Catherine Waldby (2009) for instance, highlights how the Singapore state, in trying to develop a national bioeconomy, figures its population as experimentable bodies with value that can then be extracted.

Waldby (2009) describes the development of a biomedical infrastructure which constitutes a large mass of scientists, the collection and generation of data through

³⁹ In an interview with Professor Lee, a faculty member from the school of Public Health and scientist involved with the National Precision Medicine program in Singapore, he said that while Singapore's healthcare is already among the best in the world and that in its current form, it would be able to cope with the diabetes and other healthcare issues. But for Professor Tai, pursuing precision medicine and really pushing for more investment in healthcare also meant creating jobs for the future generation. By this, he does not mean just healthcare jobs. Rather, Professor Lee expects that there will be a greater demand for labor connected to precision medicine that while uncommon and unimaginable now, will be very common in time to come. This is another way in which diabetes and precision medicine converge, that is to create jobs for future generations which in turn, helps secure the nation's future.

population cohort studies, and biobanks that facilitate this extraction of 'biovalue' from the population both in abstract (statistical inference and projections) and material (blood and tissue banks that enable experiments) ways. Aihwa Ong (2015) too highlights the way that value is created by the scientific elite in Singapore through the narrative of genetic diversity and a population that represents most of the world. The underlying assumption here, according to Ong (2015;2016) is that therapeutic advancements that have been created based on experimentation on diverse bodies (both in terms of genetics and complications) in Singapore are scalable to other populations.

The aspects relating to 'value' as well as representation are certainly clear in the DTF report , which goes on further to describe the value of the diabetes problem at a global and regional scale in monetary terms. The T2D or type 2 diabetes market, was set to triple in value from US\$17.4 billion in 2013 to US\$ 45.3 billion 2022 (Coffman et al. 2015, 3)⁴⁰. The report was also very specific with the area of the market in which Singapore could capitalize: microvascular complications of diabetes. These are essentially complications that arise from high blood sugar, such as retinopathy (vision loss), nephropathy (end stage renal disease or ESRD and chronic kidney disease or CKD) and neuropathy (nerve damage). The report again highlights that the market for

⁴⁰ Compared to the other 4 diseases highlighted by the NMRC, the cancer market is by far the largest. According to the Cancer Task Force (CTF) Report, the global estimated value of the cancer market is set to grow to US\$150 billion by the year 2020. This raises the question of why cancer wasn't chosen to headline the public health effort in 2016, if economics was in fact an important consideration as I argue here. Unlike type 2 diabetes however, the CTF report did not highlight a specific population that would provide Singapore a competitive advantage. For diabetes, this was the increasing prevalence of diabetes among Asians, which as explained, was seen as an advantage given how Singapore's multi-ethnic population represents much of Asia and Asian diasporic populations. This perceived advantage and potential 'untapped' market sets diabetes apart from the other 4 diseases.

diabetes related CKD/ESRD is expected to grow rapidly, owing to the projected increase in prevalence of T2D and the very high cost of treating CKD/ESRD.

Moreover, the report explains that there have been 'no new therapies (since the advent of renin-angiotensin blockers) that retard diabetes associated CKD/ESRD for over 20 years, presenting a huge opportunity for investment by the pharmaceutical industry' (3). The report goes on to describe the cost of such complications in terms of hospitalization and dialysis (4), further highlighting the fact that Singapore has the highest proportion of ESRD due to diabetes in the world and any effort to slow down ESRD would therefore be beneficial for the economy. The DTF report lists the unknowns in CKD/ESRD related to diabetes such as:

- a) unknown precise pathogenesis of microvascular complications in diabetes;
- b) poor uptake of established preventive strategies;
- c) unexplained substantial associated cardiovascular risk;
- d) poorly understood susceptibility factors, such as genetics; and

the desperate need for new approaches to prevention and treatment of complications due to diabetes. (Coffman et al. 2015, 6)

Other forms of research recommended by the DTF include cohort studies that conduct deep clinical phenotyping, taking stock of blood pressure, body composition, and vascular function among other measures⁴¹. The report also called for a centralized

⁴¹ To some extent, this has been fulfilled with the Health for Life in Singapore (HELIOS) project which is a large-scale cohort study based in the Nanyang Technological University's Lee Kong Chian School of Medicine. According to the website, HELIOS

effort at ‘target identification, validation and selection’ in order to avoid duplication and maximize efficiency. While there was no explanation for what this entails, the report did provide examples such as ‘large genomics databases of human genetics for target validation, access to databases for recruitment of patients for clinical trials/studies and specific phenotyping capacity for small and large animal work’ (Coffman et al. 2015, 9).

The report also called for the establishment of ‘local biomarker reference ranges for the natural history of diabetes and its phenotypic subtypes in Singapore’ to form a baseline for cohort studies (Coffman et al. 2015, 9). There is an emphasis on the need to understand how diabetes progresses and develops in Singapore’s ‘multi-ethnic Asian population’ which ‘may differ from European populations’ (Coffman et al. 2015, 9-10). This point on Asian difference was repeated in a later part of the report (Coffman et al. 2015, 10), this time in conjunction with the need to make adjustments to nutrition and lifestyle. There was mention of developing dietary patterns that combine ‘culinary attractiveness, cultural identity and healthfulness (i.e. similar to Mediterranean patterns but localized in Singapore contexts) for the public and food vendors’ (Coffman et al. 2015, 10).

Lastly, the report recommended the utilization of technology, monitoring of gestational diabetes, and most importantly, the need to invest in the next generation of academic physicians with expertise in ‘primary care reform’, population health and health economics and data sciences (Coffman et al. 2015, 11). The recommended directions for diabetes research and treatment, particularly the establishment of ‘large

aims to ‘identify environmental, lifestyle and genetic factors that cause heart disease, diabetes, cancer and other chronic disease in Singapore’ (Helios-Health for Life in Singapore: Home).

genomics databases', 'local biomarker reference ranges'⁴² and the emphasis on Asian difference in diabetes research also connect with the broader National Precision Medicine program in Singapore which was officially launched in 2017⁴³, a year after the declaration of war against diabetes. According to a presentation by the Executive Director of Singapore's Precision Medicine initiative and the Genome Institute of Singapore Professor Patrick Tan, focusing on 'Asian' diseases such as type 2 diabetes through the sequencing of Asian genomes (among other approaches) has very clear 'value propositions' (see figure 13).

In a separate interview with Professor Tan, he explained how this idea of value is key in shaping science policy in Singapore, particularly in 'making Singapore attractive as a location for industry innovative products and services'. When asked about the War on Diabetes in Singapore which targets specific groups and how this ties in with the precision medicine program, Professor Tan had the following to say:

⁴² A recently published paper by scientists affiliated with the Genome Institute of Singapore claims to have mapped the population structure of Singapore by sequencing the genomes of approximately 5000 Singaporeans (Wu et al. 2019). The results of the analysis, which revealed within group genetic diversity based on the three major racial groups hold potential beyond the little island nation:

"The three major ethnicities in Singapore together provide a unique snapshot of the genetic diversity across East Asia, Southeast Asia, and South Asia. Therefore, WGS analysis of Singaporeans has the potential to benefit populations across Asia and the remainder of the globe." (Wu et al. 2019, 737)

⁴³ The Precision Medicine program in Singapore is a 10-year initiative which ultimately aims to 'transform healthcare in Singapore and improve patient outcomes through new insights into the Asian genome and data-driven healthcare solutions'. Much like the DTF report which emphasized the economic potential of research on diabetes, the Precision Medicine program also hopes to 'enhance the breadth and depth of the Precision Medicine-related industry by attracting and anchoring overseas companies in Singapore while yielding new opportunities for home-grown companies'. The Precision Medicine program falls under Singapore's strategic Research, Innovation and Enterprise (RIE) 2025 plan.

It is a tough area. The signature feature of Asia is the diversity. We recognize that there are different groups that have different backgrounds. But if you look at the different ethnic group, say Indian, Chinese and Malays, they also differ in clinical characteristics. Let's say the relationship between body mass index and diabetes risk is different for Chinese, Malay and Indians, so not just the genetics. The differences are there. The question is why? Understanding that will also give us an insight into mechanisms of disease progression and can potentially reveal new pathways to intervention. I think it is good to embrace diversity, at the very least you want to. Let's say if you have a Chinese patient, it would make sense to compare them to a normal Chinese genome than a Caucasian genome or an African American genome and there are case studies where you do want to compare it to the right control population and I think that is an intuitive thing that people can appreciate. This is also why you want to collect enough data where every individual patient, you know you have the right control group. (Professor Tan, interview)

Professor Tan begins by acknowledging the tension in using ethnic categories in bioscientific research⁴⁴. Regardless, he argues that there is definitely value in

⁴⁴ Like his colleague Professor Lee, Professor Tan also seems more comfortable discussing population difference using the term ethnicity rather than race. Both of them, in their interviews, indicated that race is essentially irrelevant when discussing populations. Professor Tai for instance, explains that race and ethnicity are distinct but correlated:

Ethnicity is, if you believe, that the way we choose to live our lives has an impact on health, and you accept that ethnicity involves making choices around how we live our lives, it seems shocking to me that there wouldn't be a relationship between ethnicity and health. I think it becomes a problem when people don't clearly separate ethnicity from race or ancestry. I don't think they're the same thing. I think they're correlated but

understanding the different ways in which diabetes affects these different groups in Singapore. This diversity that is present in Singapore and broadly, Asia, which can be captured through clinical observations and population genomics, is seen as important because of the potential to ‘reveal new pathways to intervention’. The professor went on to explain that there is also a need to create a ‘normal’ Chinese genome profile (and for other ethnic groups) as reference points to better treat patients. This data on reference genomes based on the different ethnicities in Singapore is an important aspect of the precision medicine program, particularly as it seeks to generate value through creating a database of the ‘Missing Asian Genome’ as seen in figure 13.

When asked whether this approach to ‘genomizing’ the Chinese, Malay and Indians effectively excludes admixed populations, the professor had this to say:

I think that we recognize that there is admixture. For the peranakans for instance, there have been a dilution of the Malay, so I am Peranakan by the way and I have a bit of Malay in my own genome. There are statistical measures, say you throw in a genome and see what it matches closest to. I define myself as Singaporean more than anything else. (Professor Tan, interview).

The last part of that quote was particularly interesting. While Professor Tan does acknowledge his mixed background as a peranakan, which is a combination of Chinese and Malay ethnicities, he defers to statistical technique which presumably will place him

by chance. They’re not correlated because of biological reasons. People of a particular ancestry group, they lived in a particular place, and they chose their mates from around there before air travel was available and they lived their lives in a particular way and a consequence they look a particular way but the look had nothing to do with the other thing. So I think it is a mistake to think about them as equal. (Professor Lee, interview)

in one of these preset categories of Chinese, Malay or Indian. These categories, which are essentially colonial constructs, hold immense power within scientific practice. They are practically incorrigible, with deviations from the norm being reined in so as to be able to maintain a particular vision of diversity which is crucial in the state's broader bioeconomic aims.

We will be revisiting the National Precision medicine initiative in the coming chapter but for now, it is sufficient to highlight the similarities in the language used in the DTF report and the brief for the precision medicine program. The emphasis is on the intensification of research activity which involves an experimentable population, much like what Waldby (2009) and Ong (2015) described. Only this time, the 'value' is extracted from sickly, diabetic bodies that could potentially be beneficial to Singapore's long-term future. So how did all of this information and recommendations from the report shape the declaration of a War on Diabetes in 2016? What is clear here is that the DTF report preceded the declaration made by Health Minister Gan. In the previous section, I discussed the ambiguity in the reasoning behind the status of diabetes as a key health issue in Singapore⁴⁵. The data from governmental and public health agencies certainly did not point to diabetes as a clear frontrunner in terms of the seriousness posed by the disease to the public.

⁴⁵ It is also worth noting that in an interview with one of the co-chairs of the diabetes task force, Professor James Best (whose name was also included in the DTF report), he expressed his surprise at the escalation of diabetes into a national health issue, since diabetes prevalence rates seems to have, in his words 'levelled off' in the years leading to 2016.

Value Proposition For Precision Medicine In Singapore

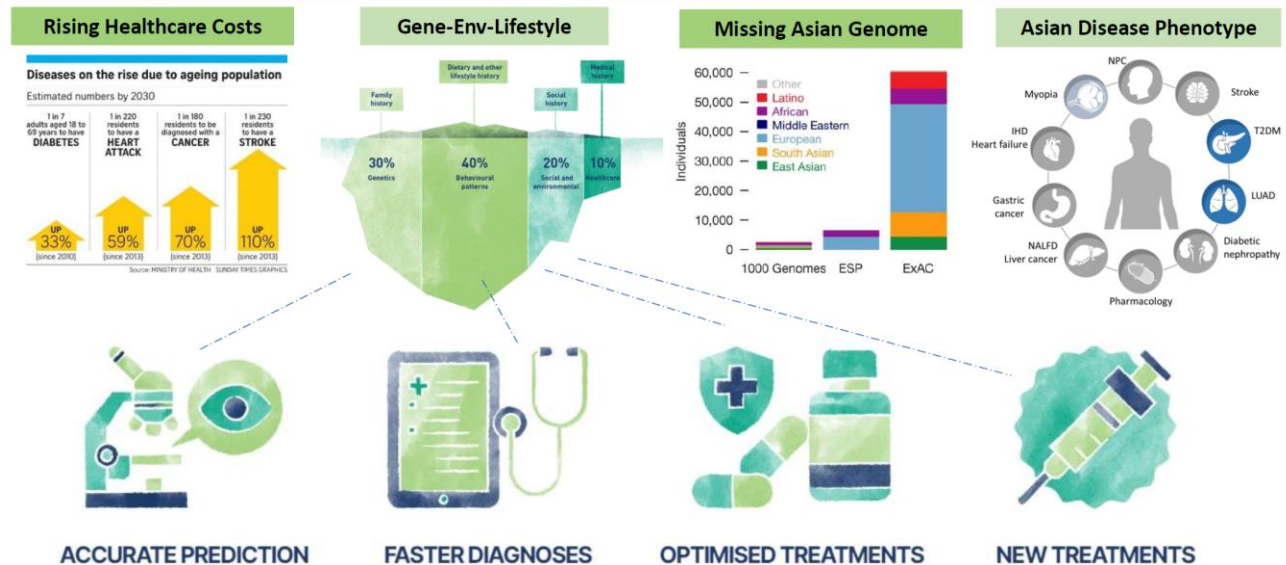


Figure 13: Precision Medicine in Singapore by Professor Patrick Tan

However, if we situate the declaration of War on Diabetes within governmental strategic plans such as that outlined in the DTF report, it becomes apparent that the economic aspects of diabetes are just as important as the public health considerations. In other words, the War on Diabetes is as much an economic project, as it is a public health one. Key to this project is the idea of the multi ethnic population as a resource that simultaneously leverages same-ness and difference. Same-ness in the sense that Singapore's ethnically (and genetically) diverse population comprising Chinese, Malay, Indian and Others is perceived as being representative of a subset of the world's population, particularly 'Asians'. Difference in the sense that the etiology, symptoms and complications of type 2 diabetes are distinct among 'Asians', but especially distinct when comparing 'Asians' to 'Caucasians'.

Institutional Competition and the Science behind a Racialized Public Health Problem

In the previous sections, I sought to trace the origins of the diabetes problem through examining the way in which it was framed as a public health problem, as well as elucidate the predominant economic reasoning behind the War on Diabetes. I argue that diabetes, particularly in the way that it has been constructed as *the* public health problem, cannot be understood independently of national political and especially economic shifts in Singapore society. This section extends this analysis by examining another facet of the public health landscape – institutions. Specifically, I examine the dynamics of institutional competition and how research on diabetes conducted in Singapore’s newest medical school, the Lee Kong Chian School of Medicine, became important in a crowded biomedical landscape.

To better appreciate the role of institutional competition in the elevation of type 2 diabetes into a national issue, we first need to understand the history of the Lee Kong Chian School of Medicine (henceforth LKCSM). The LKCSM was born out of a partnership between the Nanyang Technological University and the Imperial College London. The LKCSM, which enrolled its first batch of undergraduate students in 2013 (Lee 3 July 2013) sits alongside two other medical schools— the National University of Singapore Yong Loo Lin School of Medicine which is the oldest medical school in the country (Lee 2005), and the Duke-NUS graduate school of medicine which was set up in 2005 through a partnership between the National University of Singapore and Duke University (Bringing Graduate Medical Education to Singapore The Duke-NUS Story). As a comparatively new medical school and research entity, LKCSM understandably lacked the networks and research capacity of the more established schools. This is

where Professor James Best, who served as dean of the school between 2014 and 2021, comes into the picture.

According to his biography on the National University Health System webpage, a hospital system that is attached to the National University of Singapore, Professor Best has practiced endocrinology in Australia, Hong Kong, the United States of America and the United Kingdom (Prof. James Donovan Best National University Health System). He left his position at the LKCSM 2021 to rejoin the University of Melbourne as honorary Professor of Medicine. His University of Melbourne profile page indicates his long list of research projects, which include diabetes care delivery and managing complications from type 2 diabetes (Prof. James Best Find an Expert: The University of Melbourne). Crucially, James Best was also part of the diabetes task force discussed earlier. In fact, he served as the co-chair for the committee. During an interview with Professor Best, he pointed out that some of the recommendations for expanding the research on diabetes, particularly the ones on genomic research and precision medicine were picked up by researchers in his school under the Health for Life in Singapore or HELIOS project, headed by Professor John Chambers.

In a 2017 interview with the LKCSM newsletter titled 'Tackling Diabetes with Large Cohort Studies' (Lim 28 August 2017), Professor Chambers explained that the HELIOS project, which is a multi-year cohort study tracking the health of Singapore's diverse multi-ethnic population (the newsletter also mentioned how Professor Chambers thought that the population make up would help understand why Asians are at greater risk of type 2 diabetes compared to Europeans) will 'eventually be the most comprehensive evaluation of the health of Singaporeans and permanent residents.'

Unlike previous large scale epidemiological surveys, the HELIOS study will combine cutting edge omics (including whole genome sequencing of project participants) with deep phenotyping which includes an ‘assessment of lung function, body composition, bone density, blood vessel structure and function, eye health and a wide range of blood tests for each participant, and then follow their health status over the long term’ (Lim 28 August 2017).

The research would also enable him to ascertain whether ‘DNA methylation, a regulator that switches genes on and off, and other molecular biomarkers can be used to better identify and treat people who are high risk of developing type 2 diabetes’. Ultimately, the point of conducting this research was to translate findings from omics into ‘stratified approaches for prevention of type 2 diabetes’. The promissory narrative that ties type 2 diabetes in Singapore’s population to precision medicine or rather the promise of precision medicine is repeated here but what is important is the concrete execution of goals which we saw in the DTF report. This is not to say that the promise of precision medicine for diabetes has been fully realized. Rather, it has been set in motion through the HELIOS research program at LKCSM.

The biographies of both Professor Best and Professor Chambers play an important role in underlining the biological difference between Asian and European populations when it came to the prevalence of diabetes and its symptoms. In his previous role as a clinician and researcher in the United Kingdom, Professor Chambers observed that South Asians were highly susceptible to cardiovascular diseases, even at younger ages. This led to him conducting a study in London and parts of the Indian subcontinent to understand the role of genetics and the environment in elevating

disease risks (Lim 28 August 2017). On his University of Melbourne page, Professor Best's primary interest is in risk factors for heart disease in Aboriginal and Torres Strait Islander populations in Australia (Prof. James Best Find an Expert: The University of Melbourne). For both then, population difference is key to advancing the research program at LKCSM. When I asked about the relevance of race and ethnicity in diabetes research and the broader public health messaging in Singapore during an individual interview in 2019, Professor Best asserted the following:

The genetic predisposition is different. The physiological changes are different. In European populations the insulin resistance is the biggest factor. In Asian populations, beta cell failure and insulin secretion is the main factor. Problem with Asians it seems, is beta cells dysfunction and insulin secretion which tends to occur in earlier age, with complications being more severe. Kidney failure, more than Europeans for instance. Complications of peripheral vascular disease which causes amputation of limbs is highest in the world for diabetes. (Professor Best, interview)

He makes it clear here that biological differences between Asian and European populations play a key role in our understanding of both the causes and complications that arise from diabetes⁴⁶. The language used here echoes that of the DTF report which

⁴⁶ Coopmans & Tan (2018) make the argument that biomedical scientific research in Singapore follows a logic of racial/ethnic differentiation because as a mode of scientific articulation, it is 'recognizable and productive to multiple stakeholders' (256), thus making the research program 'do-able' (254). In this case, we see how the categories of race and ethnicity and especially the idea of difference that Professor Best and Professor Chambers utilized in their previous research become seamlessly integrated into Singapore's racialized system as well as existing narratives regarding Singapore as Asia (Ong 2015;2016).

similarly stressed the unique-ness of Asian genetics and physiology in diabetes research. This is unsurprising, given Professor Best's role as co-chair of the task force. In fact, he went on to provide an in-depth description of the broader vision of diabetes research situated in LKCSM that overlaps with the recommendations in the DTF report:

There is (sic) 2 goals to this. One is what kind of diabetes you have, there is quite a spectrum (Asian vs Europeans). But there is a mix. People have looked at the subgroup of diabetes, by genetic analysis and how it progresses, who gets the complications, who responds well to traditional therapy, who will rapidly progress to the point of needing insulin for example. If you can predict who will have severe form of diabetes, spend more time with them and improve access and support for nutrition and exercise, more motivational interviewing, and the people where have diabetes but is benign and wont progress much, that's one of the goals of genetic analysis. Stratifying or personalized or precision medicine. It is trying to identify those with the greatest risks and focus our health dollars on them, rather than we've got a hundred people and a hundred thousand so everyone gets a thousand each. (Professor Best, interview)

What is different in this particular expression of goals for diabetes research and precision medicine is its focus on the efficient utilization of public health resources, rather than the economic goals stated in the DTF report. Perhaps it was the context in which the interview happened which brought out Professor Best the public health researcher rather than the administrator/dean or government advisor. Or maybe he felt that the economic benefits that were part of the DTF report were not as important as the public health implications of the research program that was being pursued at LKCSM. Regardless, the continued emphasis on ethnoracial categories (Asians vs Europeans)

or what Professor Best regards as 'population' difference, led me to ask about how race and ethnicity matters in public health initiatives in Singapore:

We should stratify by ethnicity because that is a phenotypic as opposed to genotypic differentiation, if we know Malays have much higher risk of complications, we should work harder with Malay people who have diabetes. There are different ways of stratifying in fact to date the phenotypic stratification is more accurate than the genotypic stratification but eventually we will be able to combine all of this data. You add in metabolomics, proteomics, add it all up into precision medicine predicting who's at greatest risk and therefore who needs extra assistance. The other reason is the genetic analysis is gene code for protein and if you look at that particular gene and what its function is, enzyme or structural protein, you can discover the actual dysfunction as a result of that gene or gene variation, then target that function and design a therapeutic drug. We are quite a long way from doing either, I am excited by the discoveries and I'm excited that we are learning more and more and what causes diabetes and complications. There have been dramatic improvements. (Professor Best, interview)

My question on race and ethnicity was born out of existing concerns in the world of science regarding the essentializing of ethnoracial categories in genomic medicine and more broadly science. In genetic epidemiology for instance, scientists conduct research to connect disease biomarkers to populations sharing similar genetic profiles, thus allowing for the construction of disease risk-susceptibility statistics ascribed to differentiated populations. Very often in these fields, 'population', which the good

Professor Best invoked, serves as a euphemism for race (see Fujimura & Rajagopalan 2020) and the danger here is that framing of medical issues and research through the racial prism lens 'naturalizes' (Prainsack 2015) racial differences as 'bio-genetic' (Fullwiley 2015, 37), possibly leading to the acceptance of an essential-biological concept of race in everyday social life⁴⁷. There is however, a more sinister implication to the use of ethnoracial categories in genomic medicine. In cases where disorders are heritable (such as type 2 diabetes), scholars have pointed out that it paves the way for racial eugenics (see Duster 2004) and this is not an entirely unfounded concern given the postcolonial history of eugenics in Singapore described in the earlier chapters.

Of course, this has not happened but it is always interesting to see if scientists, especially scientist administrators such as Professor Best, have considered such a possibility. In this particular quote, Professor Best extolls the benefits of stratifying by ethnicity in diabetes research. Note that he did not ask about the differences between the terms race and ethnicity which I used in my question but he did use the term Malay which corresponds with its usage as a racial category in the national public health discourse. Professor Best did not just highlight the importance of stratifying analyses in research by ethnicity to better attend to the specificities of how diabetes has affected the ethnic populations. He also explained that while attending to ethnicity, which is a form of stratification by phenotype, in diabetes research might not be the most accurate way of doing things, this will eventually be combined with genotypic differentiation in the new precision medicine program. This is a common refrain adopted by scientists

⁴⁷ The findings of a research experiment (see Phelan, Link & Feldman (2013)) seems to confirm this proposition when they found that people tended to prefer the genetic explanation for racial difference over the social constructivist one.

involved in precision or personalized medicine in Singapore and has in fact been covered by Shirley Sun (2016) when she described how scientists very often turn to ethnic and racial stratification in their analyses as an imperfect stand in until genomic analysis becomes more widespread and affordable.

That said, there is that unmistakable note of hope and promise that exists in how Professor Best articulated his vision of precision medicine as well as diabetes related research conducted at LKCSM and this connects with another important point on the institutional history of LKCSM and the broader landscape of biomedical research in Singapore. As explained earlier, LKCSM is the youngest medical school in Singapore and in many ways, Professor Best's statements represent both vision and strategy undertaken to distinguish LKCSM from the main players in Singapore. The way that this is done, according to Professor Best, is through identifying and working on an area that would not be in direct competition with the existing centers in Singapore:

The goal is not to compete. For instance, in cancer, there is a National Cancer Center and the National University of Singapore, why become number 3? Diabetes and metabolism is (sic) a significant area, there are a lot of gaps that we plan to fill. The area of focus for us is diabetes. (James Best, interview)

To that end, LKCSM, under the leadership of Professor Best and especially Professor Chambers, who was specifically recruited from Imperial College by the school to extend his research program on metabolic diseases among Asian subgroups, has indeed taken the lead in diabetes research, particularly through the HELIOS study described earlier. During the year of the interview in 2019, Professor Chambers was

awarded the prestigious Human Biomedical Sciences (HBMS) Open Fund – Large Collaborative grant for his project titled “Advancing precision medicine for cardiovascular disease and diabetes in Asian populations”. Professor Chambers’ team was one of 4 awardees of this prestigious grant which was also mentioned in the DTF report and is administered by the Ministry of Health as part of the Research, Innovation and Enterprise (RIE) plan (News Highlights Ministry of Health Singapore 3 April 2019). The other research teams that won the grant are from the National University of Singapore, the National Cancer Center (est. 2000) and the National Neuroscience Institute (est. 1999).

As an emerging research institution, LKCSM’s achievement here through HELIOS is notable. More importantly, it reflects an alignment of institutional and national goals that incidentally, involves a central figure – Professor Best. In the DTF report which Professor Best was a co-chair, one of the key recommendations made was to focus grant funding (specifically the Open Fund – Large Collaborative Grant) to two areas: 1) Microvascular Complications of Diabetes and 2) Primary Prevention of Diabetes. In 2019, the LKCSM, headed by Professor Best, won that very grant. We may never know the extent to which Professor Best managed to influence grant awarding bodies but what is certain here is that he played a key role in developing a competitive strategy that elevated LKCSM into a major player conducting research that aligns with national public health and economic goals.

How does the tracing of the institutional growth of LKCSM and the research program promoted by its key actors help us understand the construction of diabetes as a serious public health issue beginning in 2016? In the previous sections, I had

presented evidence that casts doubt on the public health reasoning behind the choice of diabetes (among the 5 major diseases) as being the face of a public health crisis. Additionally, I also pointed to the ‘extra-scientific’ rationale that undergirds the public health mania that unfolded with the declaration of War on Diabetes. In trying to understand how a disease emerged as a public health issue, it is important also for us to take stock of the national political and economic vision, as well as the biographies that constitute the cultural narrative of diabetes in the public health discourse. Scientific actors, particularly scientist-administrators, according to Michael Fischer (2018), very often lend their *charismatic voice* in selling their research program to other scientists and of course, funding agencies such as the Singapore government. This was the case in Singapore, with world renowned scientists such as Sydney Brenner and Edison Liu pushing for a greater role for the biosciences in Singapore’s economic plans (Fischer 2018).

Professor Best represents a similar *charismatic voice*, lending his expertise in metabolic disease and particularly in diabetes research to national policy discourse and more concretely through the LKCSM. He translated scientific research programs into language that is legible to politicians who hold the purse strings and an important way in which this was done was through painting an image of biomedicine and biotech that aligns with the racialized socio-political environment in postcolonial Singapore. Thus, while charismatic voice is important, it should also be situated within existing structures – race and biocapital— that necessitated translation in the first place. Yet the consequent public health narrative from this convergence of interests and concerns are not immune to challenges, as we shall see in the coming section.

Against Biocapital and Undone Science

The economic rationale behind public health initiatives, where diseases are figured as being both a problem and an opportunity, therefore deserving of the government's attention and investment⁴⁸ relies heavily on an imagined future where the biomedical industry in Singapore has been successful in creating solutions for the problem of diabetes in Asian bodies. This mode of capitalism, which some scholars term 'biocapital', relies on the embeddedness of the biosciences— its practices, information and materials such as human tissue— to generate capital (Sunder Rajan 2006)⁴⁹. Crucially, biocapital relies on the linking of notions of value with promissory narratives and imagined futures such as the ones presented in the DTF report. Ironically, this iteration of biocapital banks on the continued growth of type 2 diabetes within the Asian continent and in Asian diasporic populations; only in such a future can Singapore capitalize on this 'market-in-waiting', to paraphrase Timmermans and Buchbinder's (2010) concept.

This grand bioscientific plan has been met with resistance. In its early stages circa 2006, Singapore's bioscientific plan, which was conceived by Phillip Yeo who was the former chair of Singapore's Economic Development Board as well as the head of

⁴⁸ Approximately US\$3 billion between 2016-2020 (Hio 19 Jan. 2016).

⁴⁹ Sunder Rajan (2006) does not provide a precise definition of biocapital. However, the term can be understood to describe the embeddedness of the life sciences - especially biomedicine – within the contemporary global capitalist framework. Biocapital one of many forms of capitalisms, 'involves the circulation and exchange of money and commodities...But in addition, the circulations of new and particular forms of currency, such as biological material and information emerge' (ibid, 17). Sunder Rajan (2006) also describes the speculative nature of biocapital, where the value of a drug or treatment for instance, is linked to promissory narratives and imagined futures.

the national science and technology agency (A*STAR), became the subject of strong public criticism by Dr Lee Wei Ling. Dr Lee, who was the former head of the National Neuroscience Institute and the sibling of Prime Minister Lee, criticized the plan publicly in 2006, asserting that the “scatter-shot” approach to drug research would spread resources too thinly’ (Burton 14 Feb. 2007). This comment was made long before the War on Diabetes, but it provides a rare glimpse of pushback against the otherwise dominant narrative tied to Singapore’s biocapitalist or bioeconomic aspirations.

I found similarly critical sentiments in some of my conversations with public health researchers in Singapore as well. When asked about the War on Diabetes and its relationship to the national precision medicine program, Peter, Professor of medicine at the National University of Singapore, and opposition politician had this to say:

To be brutally honest, the reason behind this precision medicine initiative is drug and pharmaceutical development and this was actually spurred by the US FDA, I’m not sure if you are familiar with the development of the drug BiDil, for African Americans and the basis of that approval is really dodgy and it is a very weak drug based on a subgroup analysis of self-declared AA had a slightly better benefit than the white population and it was heralded as the start of precision medicine....So that is the basis for Singapore moving into precision medicine, because they see India and China as huge markets and they think that, and Indonesia for that matter, and they think that if they can develop a drug that is only effective in the Chinese or only effective in the Indians and only effective with the Indonesians, they would be multimillionaires and make a huge contribution to the economy. (Professor Peter, interview)

Here, Professor Peter lays out the rationale for investing in biomedicine, linking it to the argument relating to Singapore's multi-ethnic population, and the markets they supposedly correspond with – India, China and Indonesia. Professor Peter also asserts here that the idea of creating ethnoracial medicine in Singapore drew inspiration from the case of BiDil, a heart failure drug created in the United States that was marketed as being especially effective for African American patients. This claim has been debunked by the broader scientific community. In his book on the Bidil controversy, Jonathan Kahn, professor of law and biology at Northeastern, pointed out that despite the flawed scientific basis for this particular 'race based' drug, its approval was made possible through certain legal and regulatory loopholes that were exploited by a pharmaceutical company keen to maximize the returns to its investments (Kahn 2012). For Professor Peter however, this march towards ethnoracial medicine is symptomatic of a broader orientation towards health and life that incidentally, ties in with the objectives of biocapital:

That is the economic rationale behind this, the science is very thin, it is actually very very weak, that is actually the way in which they have gone. If you think about it from that perspective, there is nothing overtly sinister about it, and in fact it runs counter to another thread which I was about to go into, when I was telling you the reason why I got into civil society and politics for that matter, was because of the strong neoliberal view in Singapore's healthcare financing. It is sort of like an extreme right-wing version of modern healthcare. There is a strong focus on what they call personal responsibility. (Professor Peter, interview)

There are two important points made in this particular quote. The first relates to the *thin science* behind this economic plan. The second relates to the orientation of public health and healthcare which is congruous with the framing of the diabetes problem examined earlier in the chapter. Of course, in charging that the science behind Singapore's multibillion economic plan is thin, Professor Peter represents (much like Dr Lee Wei Ling) a dissenting voice within Singapore's carefully cultivated and curated *brand* of biocapitalism which relies on the articulation of race-based futures. Such of articulations of biocapital, according to Sunder Rajan (2006) very often rely on hype, vision and the promise of returns that are separated from the commodity itself. This is mainly because the commodity and other material products of biocapital innovation exists in the future. Thus, the *thin science* or the uncertainty that exists behind this endeavor is for now, inconsequential. While Sunder Rajan (2006) highlights the biotech industry in Silicon Valley as the prime example of biocapitalist enterprise, dimensions of biocapital, particularly, the promissory narratives, vision and hype certainly present themselves in abundance within Singapore's diabetes discourse and broader precision medicine plan described earlier.

The second point that Professor Peter highlighted relates to a type of public health and healthcare orientation that arguably goes hand in hand with a biocapitalist regime. It is important to note here that Professor Peter finds 'nothing overtly sinister' about this economically driven approach to conducting medical research in Singapore, suggesting that this orientation falls within Singapore's broader neoliberal system. Such a system envisions future national economic prosperity and security through the figuring of citizen bodies as economic resource. At the same time, it also offloads the

responsibility of maintaining the health of these bodies to the individual, through the emphasis of 'personal responsibility' as a form of neoliberal morality⁵⁰, much like how Prime Minister Lee framed the solutions to the diabetes problem.

The framing of type 2 diabetes as being an individual problem and an economic opportunity has very real implications on the public health approaches and healthcare system, but more importantly, it sets very clear boundaries on the type of research and expertise that can and need to be mobilized to tackle the problem. An individualized approach to public health, especially in the case of metabolic related diseases such as type 2 diabetes, ignores the very important social determinants of health that structure health harming behaviors and risk. Thus, while the public health discourse suggests behavioral (and ethnocultural) modifications and more advanced drugs and treatments for diabetes symptoms and related complications, they obscure the existing research on the prevalence of diabetes that highlight contributing factors such as employment status, access to recreational time and space, food environment, built environment and poverty (Williams and Buttfield 2016; den Braver et al. 2018). These factors would require a recalibration of public health to address the social determinants of health, which essentially means governmental efforts at tackling income disparity, labor policy and urban design that are not only politically charged but also may not present the

⁵⁰ The concept of neoliberal morality has been discussed by other scholars studying in Singapore although not necessarily in the realm of health. In her examination of family policy in Singapore, Teo You Yenn (2012, 2) defines neoliberal morality as 'a set of institutionalized relationships and ethical meanings that link citizens to each other and to the state'. In other words, neoliberal morality extends from state policies to shape what is considered morally and socially acceptable within the citizen body. Teo (2012) examines the establishment of a neoliberal morality through pronatalist and housing policies in Singapore that incentivize certain family forms (heteronormative unions formed of educated couples that take care of their elderly parents) while excluding others.

‘dual-use’ scenario that come with the coupling of a diabetic, diverse population with Asian markets.

In a sense, the push towards developing bioscientific capacity on Asian diabetes and the broader discourse on the War on Diabetes described earlier, creates a situation of ignorance regarding the social, political and historical determinants of health. I would not go as far as labelling this situation to be a consequence of ‘distracting research’ the way that Naomi Oreskes and Erik Conway (2010) described how the tobacco industry in the 1950s United States sponsored research to explore factors such as stress and genetic inheritance to redirect attention away from the overwhelming evidence showing tobacco killed people (chapter 1 page needed). However, the construction of public health in the manner explained creates a gap in knowledge regarding the broader causes of diabetes, thereby foreclosing research related to that gap. In his piece on the sociology of ignorance or agnotology, David Hess (2020) underlines the importance of the concept ‘undone science’, first proposed by Scott Frickel and colleagues (2010) to understand how the influence of neoliberal governments and corporations maintain the framing of issues that benefit powerful actors, rather than the public.

In the context of Singapore, undone science or at the very least, the obscuring of social determinants of health in the discourse on diabetes, limits the capacity for the already restricted sphere of civil society to organize and collectively push back against the grand plans to establish a biocapitalistic economy. Aside from the odd resistance from figures such as Professor Peter regarding the way that public health should be approached, there have not been many notable contestations in the public sphere. In fact, as I will explain in the next chapter, the Singapore population largely feels that the

public health approach on diabetes in one that is appropriate and this is mainly because the state expends tremendous energy and resources to create consensus in the population as a way to maintain its legitimacy.

Conclusion

In this chapter, I sought out to analyze the War on Diabetes through a social constructionist framework. I problematize the medical 'facts' and claims circulating in the public health discourse while situating the public health crisis within a broader set of shifts which include national biocapitalist aspirations and institutional competition. In doing so, I underline the centrality of ethnoracial categories and meanings that emerge from biocapitalist imaginations of a future with diabetes, one that figures Singapore's diverse diabetic population as experimentable bodies that align with a future filled with Asian diabetics that present an opportunity. At the same time, I also highlight the ways in which a particular framing of the diabetes issue based on the influence of authoritative leaders, charismatic voices in the world of science as well as biocapitalistic norms obscure other ways of doing science. Namely, this hyperfocus on precision medicine as the future of public health and as an engine of economic growth ignore the social determinants of health and extend neoliberal logics of health and governance that center on the individual. As a dominant mode of conducting science, precision biomedicine then promotes undone science. In writing this chapter, I also tried to present the glimpses of contestation to this overarching narrative on the War on Diabetes. Yet I am aware of the fact that these too are limited, given Singapore's consensus mode of governance and the pervasive neoliberal logic. This will be further analyzed in the coming chapter.

Chapter 5: Creating Public Facing Biovalues

Managing the War on Diabetes

In the previous chapter, I described the dominant framing of the diabetes problem, retracing its individualized and racialized contours. Concurrently, I problematized the very narratives that lend it coherence, pointing to the ambiguous reasoning behind the choice of diabetes as an urgent public health problem, while also foregrounding the bioscientific infrastructure as well as aspirations that animate scientific and institutional practices. Elucidating the context from which the War on Diabetes emerged is extremely important even if it may not have pointed to a causal relationship. In fact, one could argue that if the evidence to support the War on Diabetes was ambivalent, as I had charged in the previous chapter, my ‘counterargument’ was similarly flawed in that it was anchored to a presentation of contextual information and narratives that did not establish anything firm.

This line of criticism would be missing the point on social constructionism altogether. In as far as the War on Diabetes was a claims making exercise involving a multitude of actors, ideas, institutions and technologies, it is important to make this network visible and even more important, to highlight what the construction of this problem was meant to achieve. In this respect, the grammatical isomorphism found in the adjacent but different discursive spaces - public health, state economic plan and research institutions – is not a coincidence. Rather, it reveals the existence of historical and institutional conditions that enable the construction of diabetes as a ‘problem’ in

Singapore society. In other words, a War on Diabetes, particularly in the way that it has unfolded in Singapore would not have existed if not for the assemblage of politicians, public health system, economic planning body, medical researchers, racial discourse as well as technologies such as population statistics and diabetes risk screening.

The diabetes problem is therefore born out of this heterogeneous assemblage comprising human actors and other 'things' (Latour 2007), rather than strict biomedical preconditions. These cohere to form a public health narrative – the War on Diabetes – which naturalizes the problem of diabetes in the population and in certain ethnoracial communities through the mobilization of medical and scientific facts. Diabetes therefore travels beyond the realm of experts in established institutions such as universities, research centers and hospitals, to become part of the broader culture. It becomes naturalized as a cultural fact, which in turn allows the public health system to *culturalize* its subjects, which according to Fassin (2004, 173) entails the production of statements and the enactment of measures targeted at cultures whose 'representations and practices it is designed to change so that they may have a better or longer life'.

The natural-ness of this intervention also rests on a moral premise, one that promises to relieve individuals' future from suffering and this public health logic is rather uncontested. What is and has been contested however, are aspects of the War on Diabetes that are intertwined with the long term national economic goals, particularly the 'gamble' to establish the biomedical sciences as a key economic driver in the island nation (Van Epps 2006). This plan is political as much as it is economic and because of

the reliance on a continuous injection of billions of dollars funding⁵¹ from the government into the biomedical and biotech sector without immediate and visible payoff, one would think that it exposes the polity to criticism. Therein lies the intervention for this chapter.

Selling 'Big Science'

Research conducted in the intersection between race and ethnicity studies, and the social studies of science show how 'science-backed' ethnic and racial categories were mobilized in movements to push for inclusion and representation of marginalized groups in medical research (Epstein 2008; Fullwiley 2014; Montoya 2011). A similar narrative of inclusion can be seen at a broader level, where population genomics becomes entangled with national (Sung 2010; Kuo 2011; Kent et al. 2015) as well as transnational (Burton 2018) identity formation. The involvement of the state has been instrumental in these processes. Keen to extract the potential 'biovalue' (Waldby 2002, 2009) from populations, researchers in 'national science' projects have constructed narratives of population diversity to attract talent and capital (Benjamin 2009; Ong 2015, 2016). As seen in the previous chapter and in other ethnographic works on Singapore's bioscience industry, scientists are quick to project the nation's multiethnic population (comprising Chinese, Malay, Indian and Others) as a microcosm of Asia, which allows for the scaling of drugs and treatments developed locally, to co-ethnic populations across the continent (Ong 2015).

⁵¹ Between 2006 and 2016, the state poured in approximately USD 5.5 billion into the biomedical science sector. In 2016, it committed a further USD 3 billion to research and development (Liu 7 August 2023).

Yet these studies miss out on an important component in the enactment of science policy and governance. Sheila Jasanoff (2005) explains that ‘big ticket, big science enterprises’ can rarely be steamrolled through without public buy in. In other words, the public would need to be convinced of the rationale for pouring in billions of taxpayer dollars into bioscientific ventures as the Singapore government has done. Moreover, in order for this buy in to be successfully negotiated, science needs to be presented in a way that ‘fit itself into established ways of knowing in order to gain broad-based support’ (ibid, 249). This aspect of the scientific enterprise – the manufacturing of public consensus – is what I intend to cover in this chapter. Studying the interface between science, government and the public is crucial because although ethnography and analyses of scientific literature employed by extant studies allow for the reconstruction of promissory narratives that emerge from the bioscientific world, we have to remember that these are not necessarily the same forms of narratives that are accessible to the lay person.

In this chapter, I examine an instrument of governance in Singapore that plays a central role in building public consensus as well as science policy legitimacy related to diabetes as a public health issue – the media. Specifically, I examine how the construction of diabetes as a public health issue in the media compares with the narratives from within the scientific world that underline Singapore as Asia as well as the perceived economic potential that is derived from emphasizing such an association. To that end, I ask the following questions: 1) How is Asia constructed in relation to Singapore in the media discourse? 2) More importantly, how is this relationship rendered *biovaluable*? Catherine Waldby (2002) explains that biovalue is created

through the mobilization of biotechnology to induce greater productivity at the ‘cellular or molecular fragment, the mRNA, the bacterium, the oocyte, the stem cell’ (310); in short, specific technoscientific practices allows for the manipulation biomaterial to generate value. I take Waldby’s (2002) ideas beyond the lab to examine how the Singapore state as the main ‘venture capitalist’ (Ong 2015, 327) constructs and communicates biovalue in the media⁵².

Singapore presents an interesting case for examining science policy communication given how the media space continues to reflect state power in controlling narratives (Rodan 2003; Weiss 2014; Holman and Arunachalam 2015)⁵³ and the inextricability of health and medicine from political authority (Clancey 2012, 2018). Another reason for examining Singapore relates to an emerging public health concern: type 2 diabetes. A report released in 2016 projected the cost of diabetes to reach approximately USD 1.8 billion by 2050, more than double the amount in 2010⁵⁴ (Khalik 13 Apr. 2016), leading the government to declare a ‘war on diabetes’ (Lin 20 Apr. 2016).

⁵² In Singapore for instance, the multiethnic citizen body can be said to be ‘biovaluable’ because it is representative of other ethnic populations across Asia. Hypothetically this allows locally developed pharmaceutical drugs and treatment to be exported to markets beyond the small island nation (Ong 2015).

⁵³ While the media landscape has experienced some degree of democratization over the years (see Weiss 2014), the state continues to assert its influence through a combination of ‘regulatory instruments and strategies of co-optation and autoregulation’ (Lee and Willnat 2009, 100).

⁵⁴ The cost comes from medical treatment (which is mainly subsidized by the Singapore government based on a universal health coverage model) and other indirect productivity related losses.

The increasing prevalence of diabetes also represents an opportunity for Singapore's maturing bioscientific sector. A 2016 report authored by a panel of government appointed experts highlights the need for the country to advance research capabilities on the disease in order to capitalize on the expanding global type 2 diabetes (henceforth T2D) market which is set to triple in value from USD 17.4 billion in 2013 to USD 45.4 billion in 2022 (Coffman 2015, 3). Diabetes can therefore be understood as an 'intersement' device (Callon 1984, 207-8) that brings public health, technoscientific innovation and state economic planning together, providing us with the ideal locus for analyzing how biovalue is rendered legible for the broader public.

My analysis of media content reveals that similar to my own interview data presented in the previous chapter and data extrapolated from other ethnographic research, the construction of biovalue in the media discourse hinges on appeals to include Asian populations in biomedical research. The portrayal of 'Asian' diabetes as having a different etiology compared to 'Western' diabetes lends urgency to this broad inclusionary imperative. Tethered to this narrative is the construction of Singapore's potential as a leader in Asian diabetes research, owing to its twin comparative advantages - the presence and prevalence of diabetes in its multicultural population, as well as a very well-established bioscientific sector.

However, certain aspects of biovalue construction are unique to the media discourse. Firstly, while existing studies highlight *vertical scaling* (ie. locally developed treatment usable for ethnic populations across Asia) as a way to enhance biovalue, the media discourse presents a form of *horizontal scaling* where industries adjacent to biomedicine (such as food science based on Asian diets) are figured as a source of

biovalue. Secondly, the linkage between Singapore's multiethnic population as representative of Asia is problematically rendered in the media discourse because there are instances where minority subpopulations – Malays, Indians and Others – are excluded. The instances of exclusion in translating Singapore's multiethnic population into Asian represents a distortion in the process of reconstructing of Asian biovalue. This is quite distinct from what was observed in Ong's (2015, 2016) ethnographic research where the multiethnic tracked onto Asian fluidly as scientists sought to create biovalue. The implication of such a distortion is serious, as it engenders notions of differentiated biovalues for the different ethnic groups in Singapore. Ultimately, this pattern of inconsistency, where both inclusion and exclusion in the construction of Asian biovalues coexist, captures a discourse of national science that is inflected with the tension of competing forces - ethnoracial politics, global biocapitalist aspirations, and regional geopolitics.

Revisiting 'Asian' Diabetes

Aihwa Ong's (2016) ethnographic account of bioscientific research in Singapore elucidates how researchers conjure connections between Singapore and Asia using both technoscientific and affective reasoning. To create a multiethnic genome database, DNA samples from locally sourced samples are aggregated with samples from all over Asia, and then re-aligned (using biostatistical techniques) under familiar ethnic categories such as Chinese, Indians and Malays. Ultimately, Indians in Singapore can be linked with Indians elsewhere and et cetera (Ong 2016, 16). This established linkage has important economic implications; Ong (2015) highlights that it allows for the

development of pharmaceutical drugs and treatment based on populations in Singapore to be used in co-ethnic populations across Asia.

This mobility of ethnic categories in medical research grants the bioscientific enterprise in Singapore the scale that is used to justify the pursuit of biocapital (Sunder Rajan 2006). Yet it is not just the technoscientific assemblage that undergird the formation of Asian bioscience in Singapore. Ong (2015) describes the affective reasonings - in particular the discourse of inclusion - that emphasizes the need to correct imbalances in existing genome databases to conduct research on 'major diseases that disproportionately affect people in Asia' (333). Ong's (2015, 2016) deep dive into the world of 'Asian' bioscience casts a spotlight on the 'novel and distinctive' (5) modes of Asian knowledge production and identity.

While existing scholarship explore the convergence between identity making and the bioscientific enterprise through reconstructing the narratives of scientist-administrators, researchers in the public and private sector (or both) and medical experts, they miss out on a facet of the scientific discourse that is integral to the state citizen compact. Ong's (2015, 2016) research for example, derives its analytical power from expert articulations of ethnic heuristics that are based on notions of genomic pan-Asianism. Vimal et al.'s (2021) research too leans heavily on expert interviews and institutional information to reconstruct national and pan-Asian technoscientific imaginaries. However, can we assume that such articulations take a similar form in public facing discourse?

Sheila Jasanoff (2005) argues that the communication of science and its potential benefits to society is an integral aspect of the state-citizen compact (Jasanoff, 2005). More crucially, scientific communication can only be effective if it fits into 'established ways of public knowing in order to gain political support' (Jasanoff 2005, 249). Yet there has been a lack of research examining the public facing scientific discourse, a problematic gap considering that the media (both newspapers and social media content) remains the primary platform through which the Singapore public consumes scientific knowledge (Ho et al. 2015). The analysis in this chapter therefore builds on Ong's (2015, 2016) research by capturing how biovalue is constructed in the media in order to understand the ways in which the state, as the main driver of the bioscientific enterprise in Singapore, builds consensus around the use of public monies for 'Big Science' projects (Fuller 2002; Van Epps 2006).

I examined newspaper reports relating to diabetes that were published in Singapore between 1st of January 2010 and 31st December 2019. The corpus was compiled using the Factiva database and is based on 3 sources. These are The Straits Times, The New Paper and Today, all Singapore based mainstream publications that operate through print and online platforms. While the media landscape has experienced some degree of democratization over the years (see Weiss 2014), the state continues to assert its influence through a combination of 'regulatory instruments and strategies of co-optation and autoregulation' (Lee and Willnat 2009, 100). This virtually guarantees that the content delivered through the various media platforms remain in line with state

narratives and interests⁵⁵, a situation that is quite different from the United States, where health, biomedicine and biotechnology are deconstructed and debated by a multitude of lay and expert voices in the media (Briggs and Hallin 2010).

Given that my analysis focuses on publicly accessible communication relating to diabetes and how it is connected to portrayals of Singapore as Asia, the following search parameters and key terms were used: diabete* and Singapore and asia*. The search yielded 149 articles, all of which were closely read, coded and analyzed by the researcher. I began by conducting open coding, in which themes were extracted from a reading all of the articles. This yielded a total of 10 thematic categories, some of which were connected. A second round of coding was conducted and the 10 categories were consolidated into 3. These are 1) Racialized medicine 2) Asian Difference and Inclusion and 3) Asia as Singapore. From there, I try to analyze more specifically, why these narratives were emphasized, how they are presented and how they feed into constructions of 'Asian diabetes' and biovalue. While distinct, these three themes are not mutually exclusive. As I will attempt to show in my analysis, the discussion on race and medicine for instance, can overlap with narratives of Asian difference that are being presented in the media.

It should be clear from the foregoing explanation that the primary mode of studying the corpus is through qualitative critical discourse analysis rather than a quantitative corpus approach. The shortcomings and merits of each approach have been thoroughly debated (see Baker & Levon 2015) but it is worth highlighting that while

⁵⁵ Such a configuration has been at the end of some unflattering characterizations, notably by advocates of press freedom such as Reporters Without Borders.

the qualitative approach may be lacking in its ability to present trends and patterns based on frequency of terms or lexical combinations, it affords the scholar a critical understanding of the conditions, systems, principles that organize the content of discourse – ‘what is said and what is left out’ (Baker and Levon 2015, 233) - that reflect broader configuration of power in society.

Analysis of the media discourse is distinct from direct lines of communication afforded by ethnographic research or in-depth interviews. For one, journalists writing on science and medicine add a layer of meaning to the information derived from experts. The frames journalists adopt in their articles are tied to the objectives and interests of the news organizations, which are in turn are shaped by broader social and political forces in Singapore (Rodan 2003; Weiss 2014; Holman & Arunachalam 2015). Scientific press releases too cannot be divorced from the state machinery. Widely publicized research serves as a signal for what state funding agencies deem to be ‘desirable’, thereby influencing research agendas that align with overarching state objectives such as the articulation of difference and the construction of biovalue in diabetes research. Scientific reporting is therefore a collective endeavor with the final product ultimately refracting state politics and vision of a national bioeconomy⁵⁶.

Generating Biovalue with Asian Difference: Of Body Fat and Rice

How is Asia constructed in relation to Singapore in the media discourse and how is this relationship rendered *biovaluable*? It is important to note that the very notion of biovalue rests on the foundational assumption of ethnic biological difference or in this

⁵⁶ Even where journalists incorporated expert voices in their reporting, these should not be viewed in isolation. Rather, expert views represented in news articles should be situated within a broader effort to construct a narrative of biovalue.

case, Asian difference. Press releases for bioscientific research in particular, lend authoritative voice to the narrative arc of Asian difference. The idea of Asian difference in diabetes research was initially raised in a press release regarding the Asian Metabolic Phenotyping Singapore (AMPS) project which sought to identify ethnic specific factors to explain the prevalence of metabolic diseases such as diabetes in Asian societies (Chang 10 Dec. 2011). In the article, the researchers explain how diagnostics and treatments have mainly been designed for western populations and are not as effective when applied to Asian populations. AMPS is therefore framed as a correction for the population gap in research on metabolism, not unlike calls for broader representation in bioscientific research highlighted elsewhere (Epstein 2007; Fullwiley 2008).

However, the rationale for inclusion does not stop at the affective dimension. A researcher working on the AMPS project, Dr Tai, hypothesizes that perhaps 'we' Asians 'tend to put on more abdominal fat than Caucasians, and there may be differences in our ability to secrete insulin' (Chang 10 Dec. 2011). This was by no means a definitive statement, but even as a hypothesis, it introduced the idea of ethnic biological difference into public imagination. This 'making up' of the Asian, to paraphrase Ian Hacking (2007), is crucial as it provides the scientific reasoning for supporting new a 'research programme' (Lakatos 1976), one that generates questions and hypotheses on Asian difference in diabetes research. This would be reflected in later research and scientific reporting in the media discourse. The following example from 2012, further illustrates the point on Asian difference as a growing concern in diabetes research:

Professor Paul Zimmet from the Baker IDI Heart and Diabetes Institute said

Asians have an increased risk of diabetes and heart disease at lower body-mass index (BMI) levels compared to Europeans due to more abdominal fat. When European BMIs are used to determine eligibility of patients for diabetes surgery, these BMI thresholds are too high for Asians, whose bodies are built differently. (The New Paper 8 Feb. 2012)

Here, Asian difference is reproduced through the invocation of inherent disease risk that Asians face compared to their European counterparts. Additionally, the idea of abdominal fat raised earlier in AMPS resurfaces, this time in relation to the Body Mass Index (BMI). The BMI, calculated as a person's weight in kilograms divided by the square of height in meters, is widely used an indicator of risk for health complications and diseases such as high blood pressure, diabetes and heart disease (Body Mass Index US Centers for Disease Control and Prevention). The argument made in the quote above is that the current European standard for using BMI to screen for diabetes risk is not suitable for Asian populations given that it does not adequately consider body fat constitution, a better indicator for type 2 diabetes risk. Just relying on the BMI could lead to potentially higher false negatives since Asian bodies tend to develop more abdominal body fat compared to their European counterparts. This same point on BMI and abdominal fat is echoed in later reports.

A report in 2017 for instance, explained that in Asian populations, the risk of dying from fatty liver disease is higher if a person is thin and diabetic as opposed to overweight diabetics (Boh 20 Jan. 2017). The risk for liver disease among diabetics, even those with lower BMI is therefore much higher and this finding, according to Professor Koh Woon Puay, an expert cited in the article, has 'important implications in

Singapore and other Asian populations, where patients develop diabetes at lower Body Mass Index (BMI) levels compared to Western populations' (ibid). This statement builds on the previous research on abdominal fat in Asian bodies. By this time however, what was previously hypothetical becomes an important consideration in the interpretation of new research.

The body fat reasoning to explain higher Asian susceptibility towards type 2 diabetes would later be supplemented by another finding based on the 'Assessing Progression to Type 2 Diabetes' or APT-2D study. Headlined 'Asians unable to produce enough insulin', the APT-2D press release clarifies the disease etiology by pointing out a specific biological mechanism that differentiates Asian populations from their European counterparts. For Europeans, type 2 diabetes develops because of insulin resistance, a condition where the cells around the body are unable to efficiently respond to insulin and are therefore unable to convert glucose into energy for use. The problem with Asian bodies, according to the principal investigator Dr Toh Sue-Ann, is that they do not produce enough insulin in response to a glucose load. Note that this does not invalidate the abdominal fat or BMI argument but complements it. The article explains that where insulin resistance is positively correlated with obesity (which justifies the use of BMI as a risk factor for diabetes), a deficiency in insulin secretion can happen at lower levels of obesity, which is why abdominal fat would be a more accurate risk indicator for Asians.

The narrative of Asian body fat does a few important things. Firstly, it solidifies the fact of Asian difference through the voice of experts and medical scientific research. The category of Asian becomes 'racialized' in a way that renders Asians biologically

distinct from European, Caucasian or Western populations (Omi and Winant 2014). The emphasis of Asian difference is also tied to a specific condition – type 2 diabetes – thereby strengthening the association between susceptible Asian bodies and a chronic condition. Even if the biocapitalistic implications of a chronic disease (see Hatch 2016) did not come through explicitly above, the idea of susceptibility for a continental population certainly underlines the market potential that exists for diabetes.

Secondly, in as far as Asian difference represents a research programme, it is generative of new facts and areas for research. The discovery of factors and mechanisms that explain the disease prevalence in Asian populations opened up discussions on how Asians can better manage their lifestyles to keep diabetes at bay. Diet - more specifically the consumption of rice among Asians - was thrust to the center of the debate on diabetes prevention and management:

Dr Ling said that for the same amount of carbohydrates consumed, the glucose response in the blood of Asians could be as high as double that of Caucasians...

Dr Ling said people here are consuming about the correct proportion of carbohydrates, which make up 52 per cent of the food they eat. The problem is that instead of taking rice and wheat in their natural form, most consume refined carbohydrates. These are digested quickly and result in a sugar spike. (Khalik 6 May. 2016)

As Dr Ling explains, while 'people here' (presumably Singaporeans) consume refined carbohydrates such as starchy white rice, which causes sugar spikes that the average Asian body is unable to efficiently metabolize. Another research report suggests that it is high amounts of rice consumption among Asians, compared to

Caucasians that contribute to heightened risk of diabetes:

Dr Zee is armed with data...One, it showed each plate of white rice eaten in a day - on a regular basis - raises the risk of diabetes by 11 per cent in the overall population. Two, it showed that while Asians, like the Chinese, had four servings a day of cooked rice, Americans and Australians ate just five a week. (Khalik 6 May. 2016)

This research highlights that Asians' reliance on white rice as a daily staple increases the risk of contracting type 2 diabetes, a view shared by other experts on the matter. A solution that was raised in later news reports was to reduce the consumption of refined grains such as white rice and to turn to substitutes that contain complex carbohydrates. More specifically, experts recommend whole grain foods which have lower glycemic index (GI), a measure of how quickly carbohydrates affect blood sugar levels after they are digested. A low-GI option that releases glucose into the bloodstream over a sustained period as opposed to causing sugar spikes is much more desirable in managing and preventing T2D. It is important to note that these health recommendations did not just remain at the level of discourse.

Other reports indicate that the Singapore government, through agencies such as Enterprise Singapore, invested in the area of food science to push for the development of 'healthier' grains. One article for instance, describes the research that is being done by a biotech startup – Alchemy Foodtech – in order to develop technological solutions to lower the glycemic index of rice, to help contain the growing problem of T2D (Tang 11 Jan. 2019). Alchemy Foodtech produced Alchemy Fiber, a GI lowering additive that can be added to 'other refined carbohydrate staples, like bread and noodles, without

compromising the taste, color and texture' (Tang 11 Jan. 2019). What is also important to note here is the Alchemy Foodtech team identifies its market as Asia, which it claims holds 60% of the world's diabetics. Its product too is targeted at Asian food staples as described above.

But food science is not the only sector outside of biomedicine where scaling has occurred. In line with the government's push towards preventative health and broader precision medicine initiative, national scientific research arm A*Star has signed a memorandum of understanding with the hospital system to develop new, data intensive, ways of monitoring diabetics. Wearable technology and apps have been identified as new areas of innovation by the two agencies that would help 'tackle prevalent diseases in Asia' (Choo 8 Dec. 2017). Again, it is important to note that the narrative of innovation here is very much tied to the larger issue of Asian Diabetes which came up repeatedly in the news report.

In the examples above, Asia is figured as a potential market for the health sectors. There is a clear rationalization of biocapital that is analogous to Ong's (2016) idea of 'pluripotency' - T2D therapeutics developed in Singapore population can be scaled to the larger Asian population. However, my analysis on T2D also makes visible sectors adjacent to the main programme of Asian Diabetes. While bioscientific research in Singapore has mainly focused on precision medicine (see Sun 2016 or Ong 2016), the diabetes discourse in the media highlights other potentially profitable areas such as agritech and wearables. Thus, aside from its ability to 'scale up', to capture a larger pharmaceutical market, type 2 diabetes as an 'Asian' disease also derives its value proposition from its ability to expand laterally.

Janus-faced Inclusion: Which Asian Bodies are Biovaluable?

The preceding section explains how Asian difference is rendered biovaluable in the media discourse. But what exactly is meant by Asia? Who counts as Asian? Which Asian bodies are rendered biovaluable? The question of who gets represented in the imagination of 'Asia' is not an entirely new one. The very idea of 'Asia', while often contrasted with the 'West', elide complex internal geopolitical and power dynamics that intersects with nationalism (Abraham 2006), imperialism (Sun 2016; Liu 2017) or even 'reverse orientalism' (Hill 2000). I argue that beyond the model of Singapore as being a microcosm of Asia explored elsewhere (Ong 2015, 2016), Asia is projected in the media discourse in a way that is distorted, sometimes excluding ethnoracial minorities. This pattern of inconsistency captures a national science project that is inflected with the tension of competing forces - ethnoracial politics, global biocapital aspirations, and regional geopolitical histories.

The term 'Asian' was popularized in Singapore (and a few other countries in the region) as part of an Asian Values discourse in the 80s and 90s to explain the unique cultural characteristics that drove the phenomenal economic success of the Asian Tigers. While the term 'Asian' in Asian Values may seem to imply a generously inclusive category that is 'ethnically ambiguous' (Chong 2002), the core of the ideology was framed by the Singapore government as deriving from Confucian ideals that include 'hard work, emphasis on education, pragmatism, self-discipline, familial orientation, and "collectivism"' (Chua 1999, 573). Unsurprisingly, the adoption of a sino-centric ideology as national ethic led to considerable discomfort among the minority ethnic groups in Singapore (Chong 2002).

Michael Barr (2000) argues that this sino-centric orientation of the Asian Values discourse is deeply rooted in the worldview of Lee Kuan Yew, a key figure in Singapore's historical political landscape. Barr (1999) also points to Lee's view of Chinese genetic and cultural superiority which has shaped policy and racial politics in Singapore. Among other things, this has led to continued state engineering of population policy that maintains a Chinese ethnic majority through selective immigration (Barr 1999; Frost 2020) and even eugenics (Palen 1986; Barr 1999). Moreover, the Singapore government has also attempted to establish closer cultural historical connections to China, going as far as sponsoring a revised historiography (Tan 2003, 765), claiming that Chinese revolutionary Dr Sun Yat Sen provided the 'energy' for Singapore's anti-colonial nationalist movement (Yeo in Tan 2003, 766). This contrived attempt at rebranding Singapore vis a vis China forms part of a strategic attempt to secure relationship with a rising power in the region (Tan 2003).

This contextual information sets the stage for the forthcoming analysis. I will attempt to demonstrate how hyper-modern technoscientific discourses that seek to generate biovalue from Asian difference are shaped by the aforementioned currents. This results in a projection of Asian that is distorted and exclusionary, despite the broader message of inclusion tied to the Asian Diabetes program, as well as the strong institutional multicultural orientation in Singapore. It is worth describing the different ways in which Singapore is constructed as Asian in the media discourse before scrutinizing the content of Asia. The connection between Singapore and Asia are enacted in two distinct ways in the media discourse on diabetes. The first is rather

innocuous. In scientific communication about a new research initiative, Singapore is presented as being part of an Asian whole, as seen in the quote below:

The National Heart Centre Singapore (NHCS) will lead 10 Asian countries, as well as Taiwan and Hong Kong, in this collaboration with the American College of Cardiology (ACC) to share data...Aside from Singapore, Asian data will come from China, India, Indonesia, Hong Kong, Malaysia, the Philippines, Sri Lanka, South Korea, Taiwan, Thailand and Vietnam. (Khalik 6 Nov. 2015)

The aim of the research in the quote above is to create a database that is representative of most countries in Asia, with Singapore taking the lead as the main partner in the region. Other articles describe Singapore as not just being *part* of Asia but as being *representative* of Asia. This is done through *slippages* that manifest in text:

Chinese people who are overweight, for instance, have a dramatically higher chance of developing diabetes and heart disease than Malays and Indians. Indians and Malays, though at higher risk of diabetes and heart disease, possibly for genetic reasons, appear better able to resist the detrimental effects of weight gain. Being Asian alone is considered a risk factor for diabetes. (Chang 10 Dec. 2011)

The quote above exemplifies such a slippage. The researchers describe the importance of understanding interethnic difference in disease risk, hypothesizing that the three main ethnic groups in Singapore – Chinese, Malay and Indians – have specific genetic traits that lead to differentiated risk profiles for metabolic diseases. They then immediately go on to state that being ‘Asian alone’ constitutes a risk factor for diabetes.

The slippage that occurs - from describing the ethnic groups, to highlighting the perils of being Asian - is subtle yet it implies a natural equivalency between the multicultural population in Singapore and the broader continent. This connection essentially builds on preexisting scientific knowledge on the scalability of Singapore's multiethnic population (Ong 2015, 2016).

This equivalency surfaces in other reports too, reinforcing the relationship between Singapore's multiethnic population and Asia. However, in some cases the equivalency becomes enacted in a way that does not completely represent Singapore's ethnic diversity. In this study led by a Professor Koh Woon Puay from the National University of Singapore, the researchers found that Asians who shifted to eating Western style fast food regularly instead of traditional Asian diets are at higher risk of dying from heart disease and diabetes:

The study, which specifically tracked Chinese-Singaporeans, found eating Western fast food more than four times a week can increase the risk of dying from heart disease by up to 80 per cent. It also found that those who go for fast food more than twice a week are 30 per cent more likely to develop type 2 diabetes... The joint study - by researchers from the National University of Singapore (NUS) Saw Swee Hock School of Public Health and the University of Minnesota - is the first of its kind that looks at the impact of fast food on Asians. (Pang 14 July. 2012)

It is important to note here that while the report presents the findings as applicable to Asians, the study itself was based on only Chinese participants. This way

of constructing Asian in media reports recurs in other articles too. In another report describing the findings of a research on the correlation between hip fracture and diabetes, the same lead investigator, Professor Koh Woon Puay, explained that their study fills a much-needed gap in research on Asian populations:

When we think about long-term complications of diabetes, osteoporosis is not one that immediately comes to mind. But researchers at the National University of Singapore (NUS) have found that Asians with diabetes, like their Western counterparts, experience an increased risk of hip fracture...The team investigated the association of the two conditions using the Singapore Chinese Health Study, a cohort study of more than 63,000 Chinese aged between 45 and 74 years. The study was established between 1993 and 1998, and participants were followed up for a duration of 12 years. (Tan 19 June. 2010)

Again, the term Asian is utilized rather generously in the framing of the findings, despite the study sample being made up of only Chinese participants. In both of the studies that Professor Koh was involved in, assurances were made regarding the applicability of research findings for the other ethnic groups - the results based on Chinese participants can be extended to other ethnic groups. While this may well be true from a biomedical standpoint, such caveats still reveal a degree of dissonance at the discursive level. On the one hand, the broader Asian diabetes research program is predicated on the ideas of biological Asian difference and Asian inclusion in research. Yet when it comes to projecting Asia and its constituents, the inclusionary imperative seemingly takes a backseat, with the minority ethnoracial groups in Singapore effectively excluded from the 'Asian' calculus. This lack of ethnic minority representation

is all the more puzzling given the pervasive Chinese-Malay-Indian-Others (or CMIO) categories in the different spheres of Singapore public life (Lian 2016)⁵⁷.

One could argue that such a narrow definition of 'Asian' is perhaps limited to earlier research where inclusion and diversity in scientific research was less of a concern. Yet the exclusion of Indians, Malays and to a lesser extent Eurasians (who are often lumped under the category Others) in the Asian calculus also occurs in later reports such as the following dated 2017:

To beat a disease, you need to first understand it. That is why a study by local researchers which uncovered why Asians might be more prone to developing Type 2 diabetes than their Western counterparts is a significant step forward for Singapore's war against diabetes...A study of 140 mostly Chinese participants found that Asians were more prone to this type of diabetes because they could not produce enough insulin, and not because they were insulin-resistant. (Boh 18 Oct. 2017)

The report clearly states that the sample for the study is based on mostly Chinese participants, with no mention of the profile of the rest of the non-Chinese participants. Yet the findings are again represented using the category Asian, instead of

⁵⁷ This *distortion* in representation also flies in the face of epidemiological survey conventions in Singapore since ethnic representative health surveys can be traced back to the first National Health Survey conducted by the Ministry of Health in 1992. The potential reasoning behind focusing on one ethnic group to eliminate confounding variables such as diet is not particularly convincing, given that there have been studies conducted using multiethnic samples that control controlling for dietary preferences and other lifestyle variables (see De Seymour et al. 2016 and Tan et al. 2022). Furthermore, focusing on one ethnic racial group to eliminate dietary preferences as a confounding variable is somewhat problematic since it assumes that all 'Chinese' individuals in Singapore have similar dietary patterns.

Chinese which would be a more logical and accurate statement given the sample limitations and the missing sample information. A similar utilization of Asian can be found in the following report as well, this time on a longitudinal study tracking the progression of diabetes:

“These early findings may suggest that Asians develop diabetes at much lower levels of obesity because they are unable to mount an appropriate insulin response to a glucose load. So it can potentially explain why we seem to see so much of diabetes even if we won't look particularly obese or overweight.”...The five-year, ongoing study, launched in 2016, is called Assessing Progression to Type 2 Diabetes, or APT-2D. It is led by the National University Hospital (NUH) in collaboration with Janssen Pharmaceuticals, and has so far recruited close to 900 participants, most of whom are Chinese. (Boh 16 Oct. 2017)

Even with a sample that consists of mainly Chinese Singaporeans, the researcher explained that they were able to identify the disease mechanism that explains the difference between Asian and Caucasian diabetics. It is important to note that in this example and the previous one, the qualifier mostly is used to provide an ambiguous picture of the sample. Panofsky and Bliss' (2017) research on how scientists blend racial, geographical and ethnic logics of 'population' to produce and deploy an ambiguous definition of 'population' in the field of genetics is instructive here. The authors contend that rather than dilute scientific authority through the ambiguous mobilization of population categories, this strategy actually helped them consolidate scientific authority.

The same logic could be extended in the reports above, where ambiguous reporting of sample details affords the researchers and reporter a wider latitude to make claims about the generalizability of the findings. In this case, the limitations of the research sample are glossed over to make an assertion regarding a larger population of Asians. To their credit, the principal investigator in the APT-2D study expressed in another part of the report that there is still a need to diversify the sample to obtain results that can be applied to the broader Singaporean population. There also could have been logistical constraints that led to the limited diversity in the sample. Regardless, the critique of why the findings were extended to Asians as opposed to just Chinese, which is again, the more logical and accurate move given the sample constitution, still applies here. More importantly, the implications of what this exclusion means at the discursive level also need to be discussed.

In the examples above, we see two ways in which the distortion of Asian representation is enacted. The first is through the outright exclusion of minority bodies in study samples reported. The second is through ambiguity in sample detail, albeit with an emphasis on a connection with the Chinese ethnoracial group. In both cases, the results from the studies were problematically extended to Asians. How does this impact the discursive construction of 'Asian' in the media discourse? What do the 'silences' in the articulations of Asian mean for our understanding of the broader Asian biovalue discourse? Where Ong (2015) asserts that the value of the biosciences in Singapore lie in the projection of its multiethnic population as being representative of Asia, my close analysis of the media discourse reveals this process to be somewhat distorted since that linkage excludes minorities.

The examples of exclusion highlighted above are not isolated. Of the 149 articles analyzed, 65 featured an association (part of or representation) between Singapore and Asia. Out of the 65, about a quarter or 16 articles presented a distorted narrative of Singapore as Asian where ethnic minorities were either totally excluded (12) or de-emphasized through the presentation of ambiguous sample profiles (4). Again, it is worth reiterating that the research and reporting were enacted in a socio-political context with strong multiethnic policy and history so while a quarter may seem like a small proportion to the outsider, it certainly grates against well-established ethnoracial representational norms in Singapore.

In making this line of argument, I would like to make clear that I am not way prescribing ethnoracial inclusionary politics as panacea to a perceived lack of representation in biomedical research or scientific reporting in the media. To do so would mean blindly accepting the use of ethnoracial categories in scientific practice, a point that has been extensively debated elsewhere (Fujimura, Duster and Rajagopalan 2008; Fujimura and Rajagopalan 2011). Rather, the point of troubling the construction of Asian-ness in the media discourse is to highlight the inconsistencies within the broader biocapitalist project and the construction of biovalue. Ethnoracial categories, the idea of difference and the inclusionary rhetoric seems to be emphasized in some instances but lose their salience in others.

The construction of Asian biovalue in the media discourse for example, repeatedly invokes the idea of inclusion, calling for what is essentially a recalibration of biomedical research lens in order to attend to a public health threat faced by an underexamined population – Asians. This narrative is of course, intertwined with

Singapore's biocapitalistic aspirations, as well as its multiethnic socio-political configuration as explained in the previous section. Yet the way that Asian biovalue is constructed in the media discourse do not necessarily correspond with these aforementioned ideals, with minority ethnic groups being excluded in certain articulations of Asian. Even if one might think that these instances of exclusions in research and scientific reporting were not enacted consciously, they still have an impact on how 'Asian-ness' is projected and perceived by the public.

Of Distortions and Differentiated Asian Biovalues

The 'silences' in the construction of Asian as exemplified above does the symbolic work of excluding and de-emphasizing ethnic minorities. This is consistent with the political and cultural history of Singapore where, as explained earlier, the state led Asian Values program beginning in the 80s pushed for the re-engineering of Singapore society into one that is not only culturally 'Chinese', but also with a shared history and affinity with China, thereby marginalizing ethnic minorities (Chong 2002; Tan 2003). At the material level, the exclusion of ethnic minority bodies in the framing of Asia can also be said to reflect the state's economic priorities. After all, China remains Singapore's number one trading partner and is undisputedly the largest market in all of Asia (China Market Profile: Enterprise Singapore). In fact, recently, Singapore expanded its scientific and economic relationship with China through the establishment of the Sino-Singapore Biotech Hub in China, the first of such a collaboration for Singapore in Asia (Biospectrum Asia 27 Dec. 2019; Business Insider 27 Dec. 2019). The initiative involves Singapore biotech company Biosyngen, the Singapore government, Singapore's Agency of Science, Technology and Research (A*STAR) and Institute of Molecular Cell

Biology (IMCB), and the biotech hub is set to focus on the healthcare and pharmaceutical industry.

The distortion in the construction of Asian biovalue, should therefore be located within these symbolic and material realities that connect Singapore's biocapitalistic goals with its historical and aspirational relationship with China. It becomes fairly clear then that the exclusion of certain groups from the Asian calculus point to the privileging of certain relationships and aspirations. Beyond troubling the Singapore as Asia narrative, the distortion of Asian biovalue also imply value differentiation in the national body politic. Various studies illustrate how national populations have been commodified and marketed by their governments as being intrinsically valuable for bioscientific research, be it through promoting a population diversity model as the case in Singapore (Ong 2015) or by underlining the potential advantages of 'population isolates' with reduced genetic variability that supposedly lead to a clearer path towards identifying disease-causing genes (Tarkkala and Tupasela 2018). The growth of biobanking as well as advances in whole genome sequencing have helped tremendously in these efforts to reimagine populations as a source of untapped value.

Populations can therefore be understood in this context as a resource that can be strategically aligned with the demands of biocapital in order to carve out an advantage within an increasingly competitive global bioeconomic landscape. Yet what was missed in prior analyses of value creation in populations was the further fragmenting of populations to create differentiated value. If we think about the construction of biovalue in the media discourse as an instance of promissory 'use value' creation (Waldby 2009, 310), then the distortion of Asian biovalue imply a

corresponding perception of value differentiation where minority bodies deemed as having lesser 'use value' can afford to be de-emphasized in the discursive space. It is worth noting that the high prevalence of diabetes among the Indians and Malays could be understood as posing a significant burden to the national healthcare system and the national economy . This was made especially clear in an article discussing the impact of diabetes on specific ethnic communities, where a diabetologist and endocrinologist expressed the following:

A higher prevalence of diabetes in these ethnic groups translate to a heavier healthcare burden for individuals, families, the community and the nation, he added... "It is not just a healthcare burden of coping and living with diabetes and struggling to manage it by changing ingrained lifestyle practices, but also the socio-economic impact of complications when they arise," he said. (Abu Baker 30 Aug. 2017)

The declaration of the war on diabetes in 2016 was also anchored to projections of the cost of diabetes to the national economy in the year 2050, based on a study conducted by scientists from the National University of Singapore and the University of Southern California that was reported in the news (Khalik 13 Apr. 2016). The news article also elaborated that while the cost of diabetes among the working population cost Singapore more than 1 billion in 2010, it was expected to rise to about 2.5 billion in 2050 or approximately \$10,596 per diabetic person, with 65% of this number accounting for indirect cost which includes loss of productivity among other things (ibid). The economic cost of diabetes, however one may define it, would be higher among Malays and Indians whose high rates of prevalence equate to a 'health crisis' according to the Prime

Minister of Singapore (Abu Baker 30 Aug. 2017). Taken together then, not only are Malays and Indians sometimes passed over in the construction of Asian biovalue, they are also framed as presenting negative value in the public health discourse when compared to the Chinese and Other ethnoracial groups who are less sickly and vulnerable.

Yet, if we view differentiated Asian biovalue through the lens of biocapital, the co-occurrences of inclusion and exclusion, as well as the inconsistencies that it gives rise to can be thought of as being almost normal, given that biocapitalism (much like capitalism) is born out of contradictions from which it seeks to escape (Sunder Rajan 2006, 59). This duality of inclusion and exclusion was highlighted in a similar national science initiative in Mexico, whereby Ruha Benjamin (2009, 350) explains how the 'Mexican Genome brand' being marketed to the global bioscientific community relies on both the participation and erasure of the indigenous populations in order to create an authentic narrative of admixture which ironically strengthens the 'mestizo' (ethnoracially mixed citizen subject) identity in the national discourse at the expense of indigenous identity. Ironically, such inconsistencies seem to be a consistent feature of hyper modern biocapitalist endeavors.

Conclusion

In this chapter, I investigate how Asian-ness is constructed in relation to Singapore, and how this relationship is rendered biovaluable in the media discourse. By analyzing Asian diabetes in public facing discourse, the study builds on previous ethnographic research that derive analytic power from the voices of medical and

scientific experts on the topic of 'Asian' identity in biomedicine. The construction of biovalue in the media discourse, distinct from the ways that scientists construct biovalue in ethnographic accounts, sheds light on broader processes connected to science policy. Particularly, this approach allows us to understand how the Singapore government build science policy legitimacy and consensus through public facing discourse.

My analysis shows that the presentation of biovalue in the media discourse still hinges on the connection between the Singapore population and the rest of Asia while incorporating emotional appeals to Asian inclusivity. The portrayal of 'Asian' diabetes as having a different etiology compared to 'Western' diabetes lends urgency to this broad inclusionary imperative. Tethered to this narrative is the construction of Singapore's potential as a leader in Asian diabetes research, owing to its twin comparative advantages - the presence and prevalence of diabetes in its multicultural population, as well as a very well-established bioscientific sector.

However, the presentation of biovalue in the media discourse also differs from the aforementioned ethnographic accounts in two ways. Firstly, biovalue in the media is constructed in a way that it is more clearly tied to potential market spaces. This is done through horizontal scaling. Where vertical scaling emphasizes the capacity for exporting of locally developed treatments for type 2 diabetes developed in Singapore to other populations across Asia, horizontal scaling is achieved through the development of industries adjacent to biomedicine. The food science sector in Singapore in particular, was figured as a promising area, especially in modifying the properties of rice, a staple in Asian diet, to ward off T2D.

Secondly, my analysis reveals that the connection between Singapore and Asia is enacted in a way that focuses on the majority Chinese ethnic population. Thus, while the connection between Singapore and Asia also allows for a justification of investment based on the promise of scale and the development of adjacent industries, it is also important to take stock of what is left out from such conversations. As I have attempted to show, the construction of biovalue in the media discourse is shaped by local racial politics as well as geopolitical conditions that reflect sinocentric, rather than multiethnic biocapitalistic aspirations.

My findings contribute to a broader understanding on the relationship between the state, scientific enterprise and the citizen body. Biovalue as a central justificatory mechanism for allocating state resource into science, and as a tool for building science policy legitimacy, is carefully constructed in the media discourse. In a pragmatic society such as Singapore, the vocabulary of economics and race are emphasized to fit the preexisting contours of public discourse. This in turn contributes to broader cultural knowledge on issues surrounding science, medicine and race in Singapore. Highlighting this process therefore helps us understand one of the ways in which trust in state science and medicine is carefully fostered in an age where trust in expertise, even in the context of Singapore, continues to be reevaluated.

The construction of knowledge in the media discourse remains an important tool for scientific governance and legitimacy building in Singapore. As I have argued, ethnoracial politics, biocapital and geopolitical conditions continue to shape public facing medical-scientific discourse. One wonders however, whether the inconsistent portrayals of Asian in the construction of Asian biovalue would invite greater public

scrutiny, especially given the emergent conversations on racial privilege – defined as “unearned assets cash[ed] in” by members of the dominant racial group at the everyday level (McIntosh 2018) - in Singapore society (Tang 29 Aug. 2021). Part of racial privilege entails never having to worry about being excluded in public life, which as this paper demonstrates, is not necessarily the case for ethnic minorities in the construction of Asian biovalues in Singapore. Whether Asian diabetes and other state led science projects too become entangled with similar vocabularies and generate new visions of biocapital remains to be seen but this is certainly a space worth watching.

Chapter 5, in part, is a reprint of the material as it appears in the journal *Science, Technology and Human Values*, Bin Khidzer, Mohammad, Sage Publications, 2023. The dissertation author was the primary investigator and sole author of this paper.

Chapter 6: Racializing Structures/Structures: A Tentative Conclusion

From Dual to Multiple Use

At the 2023 Oscars, host Jimmy Kimmel quipped that he should probably consider taking Ozempic, given how effective it has been for the celebrities in the audience (Yasharoff 14 March 2023). For the uninitiated, Kimmel was taking a dig at the widespread use of Ozempic among A-list celebrities, to lose weight. Ozempic, produced by Danish drug company Novo Nordisk, is a blockbuster drug that was developed to treat type 2 diabetes. The way that Ozempic works is that its main active ingredient, semaglutide mimics a naturally occurring hormone, glucagon-like peptide 1 or GLP1, that activates the GLP-1 receptors present in our bodies. This activation of GLP-1 receptors stimulates the production of insulin in the pancreas thereby contributing to a more efficient metabolizing of glucose in the body (Cultivating Health 13 September 2023). There are other ways in which Ozempic works to lower blood sugar in the body. The promotional material from the Ozempic website explains that Ozempic also prevents the liver from ‘making and releasing too much sugar’, and ‘slows down food leaving your stomach’ (How Ozempic Works to Lower A1C). Maintaining food for a longer period in the stomach also has the effect of leaving individuals feeling satiated for much longer, thereby reducing food intake and of course body weight.

This last point on weight loss is especially crucial in the story of Ozempic and diabetes. While the drug, which is administered through injections with a ‘pen’ (much like the ubiquitous epipen), was initially tested and approved by the Federal Drug

Administration in the United States for the treatment of type 2 diabetes, the often-dramatic weight loss effects observed among patients on Ozempic and popularized on social media platforms like TikTok led to widespread 'off label' use for the prescription only drug. In fact, the demand for Ozempic and other drugs that work similarly such as Wegovy and Trulicity (both of which have been approved for weight loss by the FDA) have increased so much that it caused acute shortages in 2023 and even at the beginning of 2024, a situation that is detrimental to the health of people with type 2 diabetes. What does this have to do with the War on Diabetes in Singapore you might ask? Well for one, it is worth noting that the most recent diabetes blockbuster drug did not come out of the tiny island nation, despite its efforts to rally experts, institutions and the population to defeat the scourge that is diabetes. Yet, there is another important aspect of this Ozempic fiasco that is relevant to Singapore.

The mania surrounding these drugs and their weight reduction properties spilled over to Singapore, no doubt due to the transnational and global reach of content providers on platforms such as TikTok, Facebook and Instagram. In a news article announcing the Health Science Authority's (Singapore's equivalent of the FDA) decision to approve Wegovy for weight loss in Singapore, a physician who was interviewed, spoke about the high demand for such drugs. The physician added that very often, people who did not meet the criteria to be prescribed Ozempic for instance, got angry when they were denied (Zachariah 3 Apr. 2023). A concerned member of parliament in Singapore had asked, possibly out of concern for diabetics who rely on these drugs, if the Singapore government has actually done anything to ensure that there would be no shortages. The government, through the Ministry of Health spokesperson responded

that these drugs are to be used for their intended purpose only, and that ‘there are considerable risks involved if a medication is used inappropriately’ (alluding to off-label use as the case of Ozempic in the US). Additionally, the ministry also explained that they work closely with healthcare institutions and drug companies to ‘ensure drug resiliency’ (News Highlights Ministry of Health 9 May 2023). The priority here is the patients who need the drug and the Singapore government proactively ensures that this is fulfilled through strict criteria (no off-label use), among other measures.

Comparing both the US and Singapore cases here then, we can see the different underlying systems that operate to structure drug distribution and access. In Singapore, the state is heavily involved in managing and regulating drug distribution and access⁵⁸. The US has a more liberal regime which allows for off label use – the priorities are different – the latter lets the market dictate the distribution and access to drugs whereas the former imposes restrictions on off label use⁵⁹. Yet these two seemingly divergent systems have as their focal point, a particular form – the ‘dual use’ object. Ozempic and other GLP-1 agonist drugs might have been developed for diabetes treatment but they also have remarkable weight loss properties. There are real implications for dual use objects. For one, societies that value slim bodies for instance, have led to greater demand and supply, rendering the lives of people dependent of this medication even

⁵⁸ In Singapore, the state also manages drug access through the use of a drug list, where an agency called the Agency for Care Effectiveness decide which drugs are to be subsidized by the government (Khalik 10 Oct. 2022).

⁵⁹ To clarify, Singapore allows for off label use. However, off label use drugs are not subsidized or covered by the national insurance scheme, which makes them prohibitively expensive for most people (News Highlights Ministry of Health 18 June 2022). This is unlike off label use in the United States, which is covered by insurance.

more precarious; the unregulated and unbridled pursuit of aesthetics in this case, shapes the lives (and possibly death) of the chronically ill.

This idea of dual use is not new in the field of STS. Dual use very often implies an unanticipated facet of a ‘thing’ that opens up the possibility of a different function. Ozempic wasn’t the first blockbuster dual use drug however. Viagra, the little blue pill which is now widely used to treat erectile dysfunction (ED), was initially developed by pharmaceutical giant Pfizer to treat hypertension. The discovery of its sexual enhancement properties was purely accidental and the drug was eventually approved as a treatment for erectile dysfunction in 1998. Today, aside from treating ED and hypertension, Viagra is also used off-label to treat Raynaud’s Syndrome (Smith and Babos 2023). In the case of Viagra and Ozempic, the drug makers were able to sell to a market that they did not know would benefit from the product because they did not test for the ‘unknown’ benefit, at least not initially. But there are also instances where all of the functions and implications of a dual use ‘thing’ are known and anticipated, yet ignored or even suppressed.

In the field of synthetic biology for instance, ‘uncomfortable knowledge’ (Rayner 2012), such as the potential for creating bioweapons, are purposefully ignored in order for scientists to be able to continue working without paralyzing institutional and ethical restrictions (Marris, Jefferson and Lentzos 2014). Crucially, this tells us is that a dual use thing, a drug or a molecule for instance, functions differently as it moves between contexts or networks. Diabetes too can be understood as being dual, or rather *multiple* use. Throughout this dissertation, I have highlighted how the very term diabetes, in various historical and institutional contexts, stand in for different things – nation building

in chapter 3, racial discipline in chapter 4, biocapitalist aspirations in chapter 5, and constructing consensus in chapter 6. There is also the ignoring of 'uncomfortable knowledge' or as described in chapter 4, 'undone science' involved in the construction of biocapital. State projects however, are not the only ways in which diabetes has been rendered multiple.

Diabetes Multiple

It may certainly seem so based what has been presented thus far in this dissertation. It would also not be too far-fetched if one were to think that the state driven narratives surrounding diabetes was the dominant one, given the expansive governmental apparatus I have sought to present, and the high levels of trust in experts and broadly, science within Singapore society. Yet there are, in the course of my research, *glimpses* of divergent perspectives and narratives that do not fit nicely within the prevailing ideas of racialized medicine. Archival sources in the form of clinical reports for example, describe the patient cases that don't conform to expectations. Returning to one particular clinical report discussed in chapter 2 for instance, we can detect the surprise in the physician's description of the remarkable ability of 'Asians' in Singapore to recover from diabetes mellitus:

It is becoming generally acknowledged in this area that Asian diabetics frequently show amazing returns to normal blood sugar curves after a short period of tolbutamide or insulin treatment. I feel that it is worthy of note that it now appears that Europeans living in the tropics also seem to have this power of recovery from diabetes mellitus. (Waddell 1959)

Where Asian bodies were then viewed as being ill equipped to handle the demands of civilization brought by European colonial powers, therefore making them susceptible to diabetes, this excerpt highlights their ability to defy medical consensus. Despite the supposed agency of the Asian diabetic body in this example, it remained passive, a representation rather than an active voice. Archival sources, according to Ann Stoler (2008), are replete with such instances of ‘disabled histories’ (20), partial, stunted voices that were never allowed to become fully formed narratives of their own. This idea of ‘disabled histories’ has also been highlighted by other historians such as Marisa Fuentes (2016), who in her examination of the history of enslaved women subjects, was only able to capture ‘archival fragments’ which drove her attempt to recover knowledge about figures at the margins, who are represented yet devoid of ‘voice’. This concluding chapter hopes to achieve something similar, albeit somewhat differently.

In the previous chapters, I had examined the archival ‘record’ but not in the way that we typically imagine the archives: documents a temperature-controlled space accompanied by distinct earthy scents. This archival form – formal public records that are very often managed and curated by a singular institutional author - while still important, is increasingly being seen as *one of many* sources that constitute the archive. A pluralized, multivocal, and in some ways, democratic archive incorporates the ephemeral and the everyday (Featherstone 2000), and with the internet being such an integral part of our lives today, the archive is also digital (Gill and Elder 2012). Much of my dissertation leverages digital content and this turn was initially born out of exigencies imposed by a pandemic. As I approached the end of my dissertation journey however, it

became exceedingly clear that treating the digital interweb as an archive is no longer an exceptional method, but one which is growing increasingly normal in research. There are still limitations with *my* approach to the archive. For one, my reimagination of the archive still centered on the epistemological and political anxieties of the state, as Ann Stoler would (2008) put it.

Racialized diabetes from the perspective of the developmental, insurantal and biocapitalist state, as sketched out in this dissertation are tied to dominant ways of knowing, and certainly reflect the anxieties tied to ideas of the nation. This concluding chapter extends the previous analyses through decentering the state and expert driven narratives of diabetes, and accounting for how diabetes is *done* on the ground. While the previous chapters rely on expert voices, in depth interviews, archival documents/voices and other publicly accessible documents, this chapter is structured as a praxiology of diabetes, honing in on the everyday rhythms, forms, practices that contribute to the multiplicity of diabetes in Singapore. Some of these practices can be fitted into the narrative arc of the previous chapters but in some cases, they exist quite apart from the story of biomedicine and biocapital, highlighting other ontologies that make diabetes. This, to borrow from Annemarie Mol's (2002) pathbreaking work on atherosclerosis, is the 'diabetes multiple', and the forthcoming sections will depict the different ontologies and the practices that emerge out of them that coalesce around diabetes yet in the case of Singapore, all seem to center around race.

Practice makes diabetes

For Mol (2002), the study of a disease is incomplete when we merely engage with different perspectives about it. What this does, is to elucidate the different interpretations surrounding the disease which causes the disease itself to recede into the background. Mol (2002) also asserts that when we ask about what disease means to different actors particularly to those experiencing the illness as is the case in sociological takes of 'illness experience', we end up talking around the disease, instead of the disease itself and how it affects the body. In other words, the observers and their perspectives are multiplied, but not necessarily the body itself. Mol (2002) goes further, pushing for the world of 'practicalities, materialities, events' in the study of disease to be foregrounded, that is to acknowledge that disease is done in practice (12-3). So how is diabetes done? How is it multiplied? In some ways, this dissertation has answered these questions. Diabetes is done differently across time, and it presents itself as unique in a postcolonial space such as Singapore. But of course, while these insights are invaluable, they are still confined to the realm of experts.

As I will demonstrate, diabetes comes into being quite differently at the everyday level. The insights on the practice of diabetes will be drawn from a series of interviews and observations during the final leg of my fieldwork in 2022. I had situated myself at a clinic specializing in family and occupational medicine. The clinic was located in a populous neighborhood in the west of Singapore and it seemed to serve a broad range of individuals with various medical ailments. The main reason I chose this clinic was because I had read about the physician's efforts to advance primary care as a way to

combat the scourge of diabetes in Singapore society⁶⁰. More importantly however, very few family clinics were forthcoming with granting me access to their patients. Dr S and his clinic was the only one who responded to my persistent badgering for interviews and information about patients with diabetes. Dr S matched me up to quite a few of his patients, but only 4 agreed to interviews and short observation sessions⁶¹. From the 4, I managed to get 2 more individuals with diabetes to interview. Altogether then, I managed 6 in depth interviews with individuals living with diabetes. In 2 of these cases, I also managed to interview their family members. Of the 6 interviewees, 5 had type 2 diabetes and the remaining one has type 1 diabetes diagnosed in their teens. Their actual names have been replaced with pseudonyms.

The small sample size is not really a concern here because the primary objective of these interviews and observations is not to establish a generalizable claim but rather, to highlight the depth of practices at the everyday level that constitute diabetes. To paraphrase Mol (2002), how is living with a diabetic body 'done in practice' (15)? In

⁶⁰ The physician, a middle-aged Malay male called Dr S, was very charismatic. During our first meeting, we spoke about his history in medicine and he brought me around the neighborhood, where we encountered some of his patients. He would make it a point to ask them how they were doing, bringing up their medical history and explaining them to me in great detail, and sometimes very loudly too. Patient confidentiality be damned, I thought to myself initially. But this was also a performative exercise on the part of Dr S, who explained that this should be how we combat diabetes, that is through doing rounds in the neighborhood, not through the kind of patronizing public health messages about reducing fatty and oily foods for Malays and Indians. Dr S enacted his professional duties outside of the clinic but also emphasized a way of treating diabetes that is somewhat different. Subsequent interviews revealed his openness towards complementary and alternative medicine (CAM), which includes ethnic medicine that he explained might not work in randomized control trials but surely, has some value anyway.

⁶¹ This involved me shadowing them for between 1 to 2 hours while they went about their various daily activities such as going to the shops, walks with friends and just preparing lunch at home.

seeking the answer to this, I do not just pay attention to ideas, meanings or feelings but also the material dimensions of diabetes – shoes, needles, steps, food, movements. In my interviews and observations, I learned that diabetes for some takes the form of a disciplinary practice that involve a cocktail of drugs, exercise and meticulous bodily care. Others see the doing of diabetes as involving those around them, where transforming one's affective relationship with illness also led to the active socializing of diabetes. Lastly, there are also those who understand and do diabetes through the lens of religion, weaving public health messages into a particular orientation of Islam for instance, making the practice of health moral and primordial. In furnishing these insights I do not claim to capture comprehensively, the practice of diabetes, which is one of the reasons why I decided to frame this concluding chapter as tentative. However, they do capture distinct ways in which diabetes is done on the ground, thereby highlighting divergences outside of the discourse of racialized public health and biocapital in Singapore.

Routine and Discipline

Rose is an elderly Malay woman, who is a 67-year-old homemaker. Her husband works during the day so she spends most of her time alone, taking care of her 3-bedroom apartment, and cooking. She was very excited to have heard from Dr S about my research and it was very easy for me to arrange for an interview with her. As is always the case when visiting Malay households, the host would invite me to eat, before actually beginning the interview. Rose had prepared *Nasi Goreng* or fried rice, as well as *Mee Goreng* or fried noodles. These were served in two large bowls placed at the center of the table, accompanied by smaller plates of fried chicken wings, salad, spring

rolls and a bowl of sweet durian dessert. I have grown pretty accustomed to this form of hospitality. Whenever I return to Singapore from the US to visit my aunt, my mother or my grandmother, I am greeted with just a mind-boggling amount of food. Eat, they would say. You have grown skinny from your time overseas. I was also brought up to not to turn down food that is served by one's elders. To do so would be rude and the hosts would feel *kecil hati*, which directly translates to small heart, which essentially means that they would take offense at the lack of appreciation in their hospitality. This is something that I will revisit later on, with another interviewee.

Needless to say, I ate enthusiastically and Rose was very pleased. As I gorged on the food in the large, very well-appointed dining area, I observed her heavysset figure glide efficiently in and out of the kitchen. For an elderly person with type 2 diabetes, she certainly did not seem to have any mobility issues. After I finished as much food as I was physically able to, we sat down in the living room and discussed how she managed and cared for her body as someone with type 2 diabetes. Rose explained that she was diagnosed with type 2 diabetes when she was sixty and this was during her once a yearly health checkup at the clinic. It came as quite a shock to her because she did not feel ill. Diabetes, was therefore quite invisible to Rose, that was until the doctor pointed it out to her during a routine annual health inspection. Obviously with the diagnosis, the way that she led her life changed and this began with food and the management of blood sugar, a key metric for diabetics:

I have to manage my food. If it is fatty or starchy, I will limit. Before I had diabetes, I did not manage this. Now, 3 times a day, I check my blood sugar using the finger prick blood glucose machine. I also use the high blood pressure

machine. If it shows that my blood sugar is too high, I will reduce what I consume. But if it is too low, I will feel dizzy, my head will spin. I will drink something sweet. If it is too low, I will drink half a glass of Coke. (Rose, interview)

The later part of the quote describes hypoglycemia, where the blood sugar level in one's body is too low. This can happen among those with diabetes (both types 1 and 2 although for different reasons), either because of medication, which helps reduce blood sugar levels, or not eating properly, which may also lead to low glucose in the bloodstream. Hypoglycemia by itself isn't a life-threatening issue but for the elderly, it may lead to accidents around the house. Rose explained that one of her friends who also has diabetes had hypoglycemia once, got dizzy and fell in the bathroom. She broke her hip and is no longer mobile, relying instead on her children and other caregivers. This is why, according to Rose, it is so important to be disciplined in managing diabetes because she did not want to, in her words *susahkan orang* or trouble others. This need to be disciplined in managing diabetes and its effects translates into a meticulous regime of technology assisted self-monitoring and disease management:

My medication is for diabetes and high blood pressure (see Figure 13). Twice a day, in the morning and at night. I also bought all of the equipment, the clinic did not provide me with the machines...I visit the doctor, once every 3 months. Sometimes the blood sugar levels are high, sometimes low. When I first was diagnosed with diabetes, the level was about 6.2mmol/L was the lowest. Now it is around 7, sometimes 8 but I don't know what the issue is. Maybe it is food, that I like to eat late at night, and then I go to sleep. The rice and starch from the rice probably led to the high readings...Sometimes my blood sugar levels are too

high and the doctors scold me. They tell me to not eat so late at night, go exercise. But when I go exercise, my legs feel so tired and sore. I just go for walks. (Rose, interview)



Figure 14: Drugs for diabetes (Diabetmin) and high blood pressure (Nifedipine)

This quote exemplifies the kind of discipline and self-management that we saw valorized in Arlene Tuchman's (2020) description of the culture of diabetes among white Americans during the interwar period. Tuchman (2020) describes how the diabetic, because of all of the disciplinary requirements and strictures involved in the care and management of the condition (measuring dietary intake, insulin intake, self-administered urine tests), became heralded in popular culture as model American citizens. Note also the level of 'self-expertification' through the learning of metrics, nutrition and other technical competencies in order to be able to monitor one's blood sugar levels and interpret what they mean and most of this is done independently, with the exception of the purchasing of needles for the blood sugar test which Rose explains, her son, who is a nurse, helps purchase because of his higher level of expertise. There is therefore, a tension here in Rose's doing of diabetes. On the one hand, Rose draws from the experience of her elderly friend and how she does not want to trouble others with her condition. On the other hand, Rose also acknowledges the limits of her expertise, enlisting the help of someone else she deems to be better equipped in specific aspects of diabetes care and ultimately, deferring to the opinion of the doctor whom she visits regularly.

Beyond the doing of diabetes through becoming a 'patient expert' (Tuchman 2020, 63), the quote also points to another important facet of how diabetes is done at the everyday level and this is living with ambiguity despite one's effort to manage diabetes. Rose admitted very candidly that she does not understand why her glucose levels are sometimes unpredictable, although she did posit a possible reason for the

fluctuations. Despite this ambiguity and the potential dangers, Rose has also developed a level of confidence in her ability to control her body:

It's not like you can't eat sweet and fatty foods. This is hard to avoid during festive occasions. However, when we feel that we have consumed so much of these foods, we can maybe not eat as much the following day. When I come back from visiting family and friends for example, I check my sugar levels when I come back. Then I'll plan to consume say less starchy things in the coming days.
(Rose, interview)

What is worth noting here is the centrality of festivals in the narrative of diabetes care. While Rose had expressed her befuddlement at her inability to maintain glucose levels in a predictable fashion, in this particular quote, she seems certain that in some ways, blood sugar levels can be managed through consumption strategies described. I had first interpreted this as a disjuncture between a sense of control and ambiguity. But then I realized, upon further questioning, that for Rose, the importance of Eid al-fitr and Eid al-adha and the cultural meanings attached to these festivals supersede in some ways the 'proper' doing of diabetes. It is not that measures to ensure that blood glucose levels are ignored completely. Rather, in such occasions, the usually tight blood sugar tolerances that dictate Rose's daily rhythms, become loosened. This correlation between blood sugar levels and festivities is something that the Singapore government is quite aware of, as seen in the screen grabs of advertisements commissioned by various government agencies.

In figure 15, a screengrab from the ad titled *Kita Dah Cukup Manis, Kurangkan OK* (12 May 2021) which translates to We are sweet enough, reduce OK, presents a scenario where Malay hosts discuss healthier options for their guests during Eid al-fitr or what is colloquially known as *Hari Raya*. Figure 16 depicts a Chinese New Year gathering attended which is also attended by the Sugar Archvillain, who encourages the addition of sugar to the different foods consumed during the holiday (Kungfu Fighter Hidden Sugar 20 Jan. 2017). In a later sequence, a heroine called Guardian of Health would intervene, deploying her kung fu skills to cut down sugar content in all of the foods. The same message of reducing sugar consumption can be found in figure 17, which shows an elderly lady featured in the Deepavali 2016 ad, encouraging the consumption of health foods during the holidays (Deepavali 2016 20 Oct. 2016). These are obviously prescriptions for how to do diabetes during festive occasions but of course, Rose has her own way of doing diabetes during the holidays, which involves the use of monitoring technologies still, but with modified practices. Doing diabetes here involves the use of precision technology such as blood sugar monitors to keep track of one's blood glucose levels but in ways that are flexible. In a way, precision technology facilitates the *ambiguous* doing of diabetes.



Figure 15: Screen grab from a health campaign video (Kita Dah Cukup Manis, Kurangkan OK?) targeting the Malay community in Singapore.



Figure 16: Screen grab from a health campaign video (Kungfu Fighter, Hidden Sugar) targeting the Chinese community in Singapore.



Figure 17: Screen grab from a health campaign video (Deepavali 2016) targeting the Chinese community in Singapore.

There is one more aspect of doing diabetes that was raised during the interview session and this involved the body. Rose explained that thus far, she has been fortunate enough to be able to continue being independent and for the most part, manage her condition without much help. During my visit, I had asked why she wore slippers at home, a very unusual practice in Singapore households as a whole. People don't usually use footwear at home, not even socks. Rose explained that this was mainly because she wanted to protect her feet from potential injuries. People with diabetes, very often have sensory loss in their limbs. This means that they may get cuts that they are not aware of, which if left untreated, can lead to serious infections and possibly even loss of limbs.

When I go to the clinic, the nurses will also check my legs and feet to see if I can feel anything. They use needles to see if I can feel pain. They do this every 6 months to see if there are cuts. This is why I wear slippers at home. Most people don't. When I go out I make sure to wear closed toe shoes. I walk carefully. I know my relative, she has diabetes. She wore closed toe shoes but then they were too tight. If you have diabetes, you wear shoes with a wider front. You should not even wear shoes that fit snug. My relative, she wore shoes that were tight and that led to blisters that got really bad. Thankfully, they managed to save the toe and it didn't have to be cut. The clinic tells you all of this but maybe she forgot. (Rose, interview)

At times, the overzealous protection of one's feet through wearing ill-fitting closed shoes, may also be detrimental. These are important details that occupy the mental space of someone living with diabetes. Doing diabetes also means attending to the mundane and the quotidian such as putting on proper shoes to ensure that there is minimal injury to the body. This is how the impaired diabetic body is sustained, through needles of various kinds, and closed shoes.

Shame and the Socialized Circle

In her discussion of emotions in social life, sociologist Arlie Hochschild (1979) highlights the importance of feeling rules, which are social guidelines that shape how we think we should feel in certain situations. Say we just ate half a pint of ice cream after dinner on a Thursday night. The inner dialogue over whether one should have eaten ice cream will almost probably involve feelings of shame and guilt. We then ask ourselves

why we keep succumbing to vigorous snacking which has, among other things, led to our pants getting tighter around the waist. But then we might also rationalize this behavior by invoking the unusually hard week we are having, and how we deserve to indulge in some ice cream. Self-care is not selfish! In this example, we see a negotiation shaped by feeling rules. On the one hand, we see how social guidelines on healthy eating and lifestyle shapes how we should feel about consuming (too much) ice cream. Then we also have emergent narratives of care and body positivity for instance, which present new guidelines for how we should feel.

In this section, I will explore how a person living with type 1 diabetes, which is essentially an autoimmune condition affecting the insulin-producing pancreatic beta cells, does diabetes through emotional management. In describing how this particular interviewee negotiates feeling rules, I also hope to foreground the feeling structures which take their cue from the public health discourse. Sage, is a Chinese woman in her early 30s. She works in finance, in a multinational corporation. I had to interview her over Zoom because I had caught Covid while I was doing field work and even then, in late 2022, Singapore had very strict isolation laws after being exposed to the virus. Sage began the interview by explaining that when first diagnosed with type 1 diabetes in her late teens, she experienced a multitude of emotions that included shame and self-blame.

For me, initially, it was a lot of denial, and also I think shame, from being diabetic. This in part was because of a misconception that I had back then, that diabetes was something that can be controlled by one's lifestyle habits, by one's lifestyle choices, this sort of misunderstanding in Singapore, not just for myself but also

for my family at that point in time... So there was a lot of denial, shame and blame, internal self-blame going on for me, and for my family, my mom was very supportive but then my siblings they were completely, they did not know much about it, and I would say until today they still don't know much about it. For my dad, I remember there was a lot of blame coming from him. After I was diagnosed, I would still eat things like sugar right, like snacks. I recall there was this particular instance where he made a comment in mandarin, something like, you are still eating sweets? This is why you have diabetes. (Sage, interview)

Sage makes a very clear connection between her feelings of shame and the idea that diabetes was something that one brought upon one's self. This is not entirely surprising given the overarching narrative of diabetes in Singapore. In figures 1-3, we see how management of diet, particularly the reduction of sugar in food, is highlighted as the main way to ward off diabetes and ward off diabetes. The same message of individual responsibility can be found throughout Singapore's postcolonial history, especially in and it culminated in the Prime Minister's 2017 national day speech, in which individuals and ethnic groups were urged to get themselves out of the health crisis they dug themselves into. This message was also channeled through Sage's father, who blamed her inability to control her sweet tooth to her condition. Diabetes is therefore very much individualized and this forms an integral part of the feeling rules, which in turn dictated the affective response for both Sage and her father.

Yet it is worth highlighting the temporal component in Sage's quote; this was her reaction 'back then', which implies that her perspective on this has changed, and that her reaction to this would have been different as well. In another part of the interview,

Sage actually talked about her initial misdiagnosis. With her first doctor, she was actually diagnosed with type 2 diabetes, instead of type 1 diabetes. This misdiagnosis is crucial because unlike most cases of type 2 diabetes, type 1 diabetes requires regular insulin injections because the body is no longer able to produce insulin on its own. Sage, who is university educated, explained that she was savvy enough to learn about diabetes on her own through reading medical journals, and tracking her blood sugar and menstrual cycle (she explained that because the menstrual cycle affects ones blood sugar levels, it has to be factored in when tracking blood sugar levels) which eventually led her push back against the doctor who initially diagnosed her with type 1 diabetes. Sage is a perfect example of a 'lay expert', to use Steve Epstein's (1995) term, who deploys her educational capital to not necessarily gain credibility, but to become an informed consumer within a marketplace of doctors. Sage then used this information that she learned about herself, to shop around for doctors who were able to diagnose her condition more accurately.

She also explained that this process of learning about her condition gave her more confidence to manage her feelings, as well as that of others within her social circle. Sage no longer feels ashamed of her condition and diabetes is just part of her daily life.

Perhaps rather than saying how it affects my daily life, I would say that it is a part of my consciousness, in a sense that for nearly every decision that I take, there is an additional thought at the back of my head, to evaluate the impact on my blood sugar. Not say in what I want to eat, but also what I want to do. Like if I want to go for a swim right now, then the next question in my head is, check your blood

sugar. How much is it now. If it is too high, then you should not go for a swim. If it is too low, then have some sugar with you, or eat something before you go for the swim. Or say for work, if I'm going into a meeting, the next thing would be how long is the meeting, how is my blood sugar now, and do I have to bring any sugar into the meeting. Do I have to excuse myself to go get some insulin, if my blood sugar is high. All these like small little things. (Sage, interview)

I had asked how type 1 diabetes had affected her life but Sage was adamant that this was the wrong way to see it. For her, it was just another new state of being that penetrated her everyday in ways. Doing diabetes through the 'small little things', that is constantly thinking about blood sugar levels in all of her daily activities is embedded into her very being. Doing diabetes, for people like Sage, has become a reflex. Moreover, Sage has also had to expand her routines into public space, including her workplace where as she explained, she would have to excuse herself in the middle of meetings in order to inject herself with insulin. I had asked her if she was unconcerned about people's reactions when she goes about doing diabetes related things such as administering insulin in public and she responded:

I didn't care because those were my close friends. But I recall one instance where my close friend, it was his first time, seeing someone injecting themselves with insulin. His reaction was quite adverse. He said what are you doing that is disgusting, please do that in the bathroom. When I heard it, I was quite shocked, because I didn't care but I didn't expect that to come from a close friend whom I thought understood my condition. Thankfully, another friend who was also seated at the table with us, she was angry on my behalf. She scolded the guy, asking

why are you being so nasty about this? It is not like Sage has a choice, like why are you wearing specs? Why don't you take it off? (Sage, interview)

Here, Sage recollects how even among close friends, the very act of injecting herself with insulin was met with disgust. She elaborated that she was nonchalant about how people generally reacted to her having to inject insulin but admittedly, was shocked at this particular response from a close friend. Thus, even where Sage has reached a level where she is able to manage her condition in a way that is quite impervious to the effects on an individualizing public health discourse, she is still unable to fully manage such situations. Sage explained later that she makes it a point to explain her condition to her close friends and takes every opportunity to educate people about type 1 diabetes. Doing diabetes for Sage then, goes beyond the everyday practices of self-monitoring and medication, to also negotiating and managing the emotions and expectations of those within her social circle. Doing diabetes is not just laboring through aspects of bodily health, as we saw in the case of Rose. It is not just about being a patient expert, or even a lay expert, where one attains credibility to then push back against medical diagnosis as illustrated in Sage's case. Beyond the material and technical aspects of doing diabetes, Sage's case highlights the affective dimensions of doing diabetes which entails emotional labor centering on the self and on one's social orbit.

Doing Diabetes Religiously

This final vignette involves an elderly man called Babs who claims to have South and Southeast Asian ancestry but more importantly, identifies as Muslim. I highlight his

religion in this case because unlike the previous two interviewees, Babs' ideas on health and diabetes are practically inseparable from his ideas on religion. Babs also works at a religious welfare organization which serves the underprivileged Muslim community in Singapore. He has been working there for about four decades. Babs is approaching seventy but is sprightly and very mobile. He lives with his wife and mother-in-law in a three-bedroom apartment and he claimed to never had an issue with getting around. On the weekends, he treks across Singapore on the famously efficient public transport to visit his son and one and only grandson. Babs is also very lean, unlike Rose who is quite heavysset. He does not look like someone who has type 2 diabetes, yet he does. His waist is very slim too. None of the belly fat that scientists claim is a better indicator of risk for diabetes for Asian bodies.

Babs was diagnosed with type 2 diabetes in his 50s. He couldn't quite recall the exact age. All of the memories are melded together he explained. I was very surprised because all of my other interviewees felt that the date of diagnosis was a life altering event that was etched into their psyche. Babs however, was nonchalant. He explained that for him, the diagnosis was not unexpected because he used to drink *Teh Tarik*, or black tea mixed with very sweet condensed milk, at least twice a day. However, when asked if this habit was the main contributor to the onset of diabetes, he also mentioned genetics as a key factor:

I think mainly genetic. That's one factor. How big I don't know. Genetics and that time the condensed milk. It's very bad, a lot of things that we were consuming at that time was bad. Most of the Malay food are actually *makruh* for the general

public but for me it is *haram*. This is what I've been telling MUIS. (Sage, interview)

Now there are a few parts of this particular quote that needs unpacking here. The first is the fact that Babs had a fairly nuanced understanding of how both genetics and lifestyle contributes to type 2 diabetes. The second part concerns the religious terminology used in relation to food and health. He explained that a lot of the food 'we', referring to himself and the broader Malay population in which he belongs, consume were bad. Babs then uses the terms *makruh* and *haram* to describe the various states of foods related to Islam and the Muslim identity. Makruh in this instance refers to a classification of food items in Islam that is detested (presumably because of its negative qualities) yet not necessarily prohibited. This is different from the classification of haram, which refers to food items that are strictly prohibited in the religion (Makruh Oxford reference). Babs also mentioned MUIS, which stands for *Majlis Ugama Islam Singapura*, a government affiliated body in Singapore which is in charge of administrative and religious issues for the Muslim community in Singapore. Aside from maintaining the registry of Muslim marriages in Singapore, MUIS also issues *fatwas*, or religious rulings, on various matters spanning from the religious permissibility of stem cell research to financial investments.

Babs asserts in the quote above that foods which are *makruh* following the general accepted standards are in fact *haram* to him and this is mainly because of how harmful they can be. Thus, by his very high standards, drinking sweet tea or eating starchy, fried foods for instance, while generally acceptable (and in some cases celebrated as part of Singapore's infatuation with street food), should in fact be

considered *haram* and Babs has been very vocal about this to MUIS. Certain foods consumed by the Malay community should just be prohibited, and this ties in with his view that Malays in Singapore do not practice eating healthily, leading to the high rates of diabetes in the community. This view that Babs has on food management is an outlier among the Malay and/or Muslim interviewees. For most, the idea of eating everything in moderation and reducing the consumption of unhealthy food seemed to be the line they were most comfortable with, rather than outright prohibition as Babs recommended. This stance is also something that is captured in the campaign message in figure 15, which calls for a reduction of sugar consumption especially during festive occasions because ‘we are sweet enough’.

When I asked Babs what he thought about this idea of managing consumption rather than outright prohibition, he seemed skeptical. He went as far as saying that in order for food to be truly *halal*, or permissible for consumption in Islam, it cannot be unhealthy. Furthermore, Babs pointed out that people are unlikely to moderate their food consumption, tending towards eating until they feel satiated or full. This, he explained, should not be the way:

Because I realize, for food to be truly halal, they should be healthy. Even then, the prophet said, (something unintelligible), even when you are eating good food, don’t reach the point of satiation, when you are full... We will eat and say *Alhamdulillah*. The prophet said don’t burp and they burp. It is so ugly you know. is vulgar. Really makes me angry. Goes against *Alhamdulillah*. (Sage, interview)

Babs elaborates that most people not only eat until they are full, they also eat until they burp, which he feels is 'ugly' and in his mind, contradicts the sentiment of gratitude expressed through the utterance of *Alhamdulillah*, an Arabic phrase that translates to 'praise be God'. This phrase is usually said after a meal. Note also how Babs stressed the element of aesthetic conduct when eating, as well as its association with health. When one is aware of what health entails, especially from an 'Islamic' viewpoint as defined by Babs, they would also pay attention to their conduct at the dinner table. This is what Babs regards as a wholesome understanding of religion, which in turn would help maintain one's health and, in his case, diabetes. There is another point that Babs made which is worth highlighting and this again, connects to excessive eating:

A wholesome understanding of ad-Deen al-Islam makes it easy. A few days ago, I told my brother-in-law, your mother-in-law for Eid, she loves to cook for everybody and all the food is there, and all the people, Chinese, Indian, Malay, all come, those who my wife used to take care of at Jamiyah and they will tell others to come. In the end it is a big expenditure you know. Every time they do that I say yeah I'm going out. I really cannot take it. They will feel hurt. (Sage, interview)

Here Babs expressed his very strong and fundamental disagreement with what he perceives is excessive eating during festivities. He even leaves the house as a form of protest against what he views as excessive eating. The problem he claims, is not that that people are eating a lot but also that hosts are cooking a lot and encouraging people to eat all of the food. For Babs too, a 'wholesome understanding of ad-Deen al-Islam'

which translates to the faith of Islam is crucial because it helps relieve what he perceives to be social, moral and of course bodily ills in society. Religion is not ritualistic in this sense. Religion is a way of life that if understood and practiced properly, could help maintain one's health and the kind of celebration in the name of religion which Babs expressed is commonplace within the Malay Muslim community goes against his orientation of religion. For Babs then, it is not simply religion that shapes his practice. It is a specific orientation of religion that drives how he *does diabetes*: aesthetic conduct, avoiding fullness, the storming out of social situations.

There is another aspect of Babs' approach to diabetes that stands out from all of my other interviewees and this was his preference for 'alternative medicine'. For example, on top of his firm belief that leading a way of life that adheres to Islamic principles helps manage his condition, Babs also subscribes to homeopathic remedies and radionics. Radionics, which utilized electromagnetic waves, Babs enthusiastically explained, was something that has managed to keep the numbness in his legs at bay. Every week, Babs would go visit his friend and radionics practitioner, where he would lie on a treatment bed and have his legs primarily, be scanned by a device that supposedly emitted electromagnetic waves. Only the legs. The rest of the body would cost extra, he said. During the interview, Babs also pulled out a dusty, yellowed out copy of a Pocket Manual of Homeopathic Materia Medica and Repertory (see figure 5), where he carefully flipped through to page 660, to point out the uses of *Uranium Nitricum* in treating excessive peeing which affects diabetics. I asked him if he had indeed tried this remedy. Babs explained that he has tried to get his hands on many of the remedies in the book but alas, he has not been able to. Wanting me to carry on his pursuit of

homeopathic remedies and alternative medicine, Babs actually gave me the book. He said he would be so offended if I did not take it. I reluctantly accepted.

This exchange was etched my memory but not because I felt that it fell within an ethical grey area (to accept gifts from my interviewees). After I had stopped recording the interview, and Babs was walking me to my bus stop, we talked about his family and how he regretted not spending more time with his wife when he was younger. He lost his wife to cancer very suddenly, three decades ago. He said that the doctors could have done more but they chose to let her die. I could not help but wonder if this memory of profound loss played a part in how he thought about religion and health, as well as his preference for alternative medicine which I admittedly felt was kooky. During the retelling of the story, it did seem like he had lost faith in modern medicine. It was quite a bit later, while I was analyzing his interview too, that I realized how little he had touched on treatment and medication. In studying how diseases and diabetes is done, we often think about the immediate practices; the rhythms and routines coupled with the material technologies that in some cases make these very practices. Yet emotions and sometimes memories too it seems, play an important part in guiding how people do diseases.

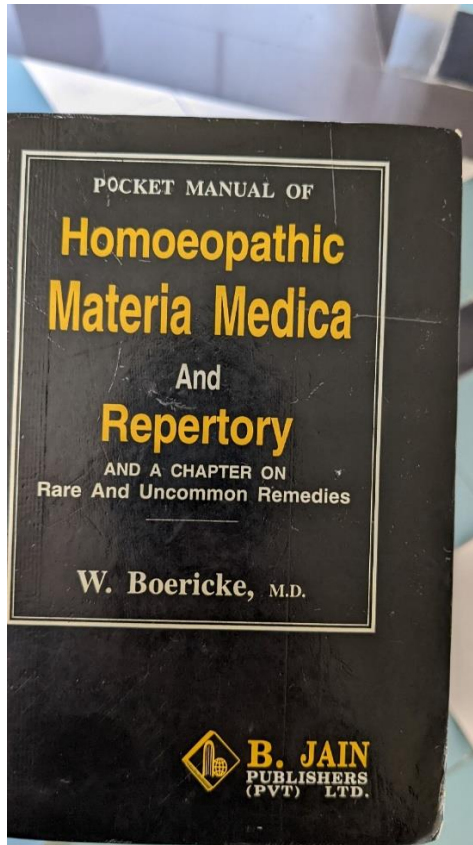


Figure 18: Book given to me by Babs.

Epilogue

I devoted the beginning of this chapter discussing the analytical utility of pluralizing a ‘thing’ such as diabetes. The advantages of multiplying diabetes as a thing are twofold. First, it decenters the narrative of diabetes in postcolonial Singapore, thereby giving a moment, so to speak, to those who inhabit the margins of public health discourse on health and disease. These interviewees may not capture the breadth of experiences of how people do diabetes, nor do they necessarily represent the specters that exist as archival fragments in history (Fuentes 2016). Yet they provide us with what I believe to be crucial insight into the doing of diabetes which complements the authoritative framings I sketched out in the rest of the dissertation. This brings me to the

second point on multiplying diabetes. Beyond multiplying ontologies to recognize, among other things, the practices that make a disease, a position that Mol (2002) clearly advocates, I have also sought to highlight ambiguities in practice, as well as the role of affect and memory in the doing of diabetes.

This dissertation began as an inquiry into how diabetes, particularly racialized manifests in postcolonial spaces and much of it is devoted to uncovering this historical and sociological process. On the ground, and for the people living with diabetes I had the privilege of interviewing, race barely registered. Between the three vignettes I showcased in this chapter, only Babs alluded to the idea of race when discussing diabetes, pointing to the behaviors and traditions of Malays as being problematic. Yet, it was religion that drove the articulations and practices associated with diabetes in that instance. This is by no means a conclusive observation, nor does this invalidate the historical racialization of diabetes that I have carefully reconstructed in the rest of the dissertation. Given my limited time in the field, and the fact that I only conducted in depth interviews and observations, it is very likely that I had missed other ways of doing diabetes at the everyday level that were racialized, possibly even gendered. Singapore certainly doesn't qualify as a post-racial state, at least not in this moment. Race plays such an important role in governance and as I have sought to show in the earlier chapters, within science, medicine and public health. Moreover, I certainly have not explored the intersectionality between race and gender in medicine, be it at the everyday level or in the broader public health discourse. This is definitely an area that will be expanded upon in future iterations of this research, beginning with public health concerns surrounding gestational diabetes which was briefly covered in chapter 4.

There are other aspects of this dissertation research which I feel need to be expanded upon. One of the more exciting developments that I touched on in the later part of the dissertation concerns new research on Asian Diabetes. Specifically, I highlighted how scientists discuss the unique biology of Asian bodies and how they present different risk indicators compared to Caucasian bodies. The cause of diabetes too has been found to be different for Asians compared to other populations. The usage of 'Asian' in the disease discourse reinforces the association between an ethnoracial population and type 2 diabetes, giving rise to an idea of shared culture, behavior and conditions that contribute to the incidence of diabetes in that group. Yet the term Asian Diabetes itself conjures different meanings in different contexts. In the United States for instance, it refers to the prevalence of type 2 diabetes among Asian Americans, explained to be a consequence of a transition to 'Western' diet (Bright 2014). In Singapore, Asian Diabetes is tied to the construction of 'Asia' as a scaled-up version of Singapore's multiethnic population; hypothetically, this enables the scaling up of locally developed diabetes measures and treatments to a larger Asian market (Waldby 2009; Ong 2015).

The differences in how scientists from these two countries think about Asian Diabetes is crucial, especially since one of the most visible research programs on Asian Diabetes, the Asian Diabetes Prevention Initiative (ADPI), comprise researchers from Harvard and the National University of Singapore. The main objective of the ADPI, according to their website, is to conduct more research on diabetes among Asians to create preventive measures and treatment tailored to Asians, a hitherto underserved and ignored population. Given the differences in thinking about Asian Diabetes in

Singapore and the US, how do scientists involved in transnational collaborations construct a coherent 'Asian' subject for disease research? Beyond investigating the construction of Asian Diabetes, what do we miss when focusing on Asian genetics, body shape, or diet in tackling the diabetes epidemic? These questions will form the basis of my future investigation on the making of Asian Diabetes in Singapore, and beyond.

As I approach the end of my writing, artificial intelligence (AI) seems to have gained momentum, creeping into the world of health and medicine. Diabetes Singapore, a government agency established to support the nation's effort to combat diabetes, has embraced a screening tool called Selenia+ that relies on AI image analysis to detect diabetic retinopathy, among other eye conditions (Tan 28 Jan. 2021). AI, it seems, is the new frontier in diabetes medicine. Yet AI itself isn't without issues. Already, a 2023 research paper published on PLOS Global Public Health has highlighted racial bias in risk prediction algorithms (Cronjé 2023). The implications of such bias are very real. This US based study shows that there is a possibility of misdiagnosis with the tool, leading to missed interventions or overtreatment among minority groups such as non-White Hispanics. It remains to be seen how this AI driven diagnostic tool would affect Asians in the US and of course, in the Asian continent. This is certainly an exciting space to watch.

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