1 Introduction

> I remembered the bombs, the incendiaries and the scattered bodies, and it occurred to me that living might be the price, not the reward of survival
>
> Stratis Haviaras – *The Heroic Age*

If the ever-obliging Martians agreed to review the current state of human nutrition, they would be forced to report a crisis. Although humans are numerous (around 7.3 billion), geographically widespread and able to live on average for about 68 years, almost half of those alive are either undernourished or overweight. Around 1 billion lack access to adequate food, and undernutrition is the primary reason why in some countries up to one child in five dies before five years of age. At the other extreme, roughly 2.1 billion are now overweight, with around 800 million adults clinically obese.[1] In turn, excess weight is the strongest marker of a global epidemic of degenerative diseases and premature adult mortality. The Martians would probably consider malnutrition, encompassing both extremes of body weight, a defining characteristic of our species.

The Martians would immediately recognize that, with minimal exception, humans practice agriculture rather than foraging for wild resources. But they could be forgiven if they reached another conclusion: that this system farms not only crops and animals, but also humans themselves, and is geared towards producing not only food but also power and wealth, all of which end up highly unevenly distributed.

This, then, is a book about human nutrition and health. But if you are expecting a discussion of what foods make a healthy diet, how much physical activity should be undertaken each day or what is the ideal body weight, you will be disappointed. Such a book would presuppose that if we knew these ideals, all could readily adopt them. This book looks at nutrition and health from the reverse perspective: I want to address how our hierarchical societies undermine healthy living.

I use the term 'nutrition' throughout this book very broadly, referring not only to food intake but also to physical activity patterns and the condition of the body in terms of its growth, composition and ability to resist infectious diseases. I want to understand why our nutritional status plays such an important role in the unequal distribution of ill-health. I will direct most attention to 'chronic diseases', such as obesity, diabetes, hypertension, cardiovascular disease and stroke, but I will also address undernutrition. These two types of malnutrition may both be considered 'metabolic syndromes' – one where the body receives inadequate nutritional fuel, and the other where it is unable to accommodate excess circulating fuel.

Table 1.1. The United Nations Millennium Development Goals

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Global partnership for development

My primary thesis is that the relationship between nutrition and health is deeply embedded in power relations, and that it always has been. Only if we understand this broader scenario can we assess how contemporary capitalism shapes our health through the medium of nutrition. Indeed, we will not fully understand the nature of capitalism until we look inside the body.

Human malnutrition is increasingly recognized as a global problem. In 2000, the United Nations established eight 'Millennium Development Goals', intended to mobilize unprecedented national and institutional effort to combat poverty and ill-health (Table 1.1).[2] Nutrition clearly transcends these goals, yet one could also argue that it is explicitly acknowledged only in the first of them, and has thus been rendered relatively invisible. Chronic diseases are absent from these goals, despite being closely associated with poverty, unhealthy lifestyles and unsustainable use of environmental resources.

Even if we do acknowledge the importance of nutrition for health, do we know what must be done to resolve malnutrition? A vast amount of scientific and policy research has been conducted. Over 2 million scientific articles have been published on the topic of cardiovascular disease alone, though far fewer on undernutrition. Despite this effort, chronic undernutrition remains widespread in most global regions, while the numbers affected by obesity and chronic diseases are rapidly increasing worldwide.

Looking beyond obvious and immediate causes such as unhealthy diets and living conditions, the last decade has seen particular emphasis on the 'social determinants' of ill-health and premature mortality.[3] This approach, initially developed to address high-income countries, recognizes that the primary factors predisposing to common forms of ill-health cluster unequally across social hierarchies. Substantial research has shown that the influence of hierarchical position on health is mediated by the stress response, which in turn is shaped by socio-environmental factors such as access to healthcare and employment, the quality of the working environment and the magnitude of community social support. Exposure to adverse conditions in early life is particularly important, generating lifelong health penalties. This approach also acknowledges the mediating role of nutrition: those lower in social hierarchies have poorer diets and less opportunity for leisure-time physical activity, while exposure to harsh economic and social conditions drives high use of alcohol, drugs and tobacco. In high-income countries, therefore, obesity and chronic diseases cluster among the poorer groups.

This paradigm offers a valuable lens through which to focus on contemporary health inequalities in countries such as the UK. For example, London is often described as a collection of small villages, but despite being close together as the crow flies these localities differ remarkably in their quality of life. A recent study found that travelling east from Westminster to Canning Town on the Underground, the decline in male life expectancy between these two boroughs is equivalent to a fall of 0.75 years for each station passed on the way.[4] Male life expectancy at birth is 77.7 years in Westminster, but 71.6 years just a few miles away in Canning Town. Female life expectancy declines from 84.2 to 80.6 years over the same distance: half a year per station. This social gradient within a single city is merely a local manifestation of a broader national pattern. In England overall, the poorest groups live for 10 years less on average than the most affluent.[5] Moreover, they are more likely to suffer from chronic diseases and acquire them at younger ages, so that they experience 20 fewer years of healthy life on average than the most affluent.[6] Social hierarchies thus have profound implications for health and longevity.

Despite the strengths of the 'social determinants' paradigm, it leaves several crucial questions unanswered at a global level. First, why are humans so prone to hierarchical societies in the first place? Second, whatever the role of psychosocial stress, why should hierarchies leave such profound imprints in *nutritional* aspects of health? And third, why do social gradients in health in low- and middle-income countries show striking differences from those in high-income countries?

In low- and middle-income countries, lower socio-hierarchical position is undoubtedly associated with poor health, in particular mediated by undernutrition. But in these countries, obesity and chronic diseases remain commoner among the more affluent sections of society, though that does not mean they are entirely absent from poorer groups.[7] In other words, being higher in the hierarchy in these countries elevates risk of the same diseases that are most common in groups lower in the hierarchy in high-income countries. Clearly, these diseases have no uniform association in humans with wealth, or with socio-hierarchical position. There is something more complex going on, and that is the kernel of this book.

My question is very simple: in any population, how much agency do individuals really have to achieve nutritional health? The answer is anything but simple. Associations between nutrition, health and power relations do not manifest on an immediate basis in terms of current behaviour. Rather, both undernutrition and chronic diseases emerge through cumulative processes stretching across lifespans and generations. The power relations experienced across such lengthy periods may change profoundly. Furthermore, many layers of power are built into the structure of society and are relatively well concealed. In many ways, when it comes to our malnutrition, we have been co-opted to 'demand our own oppression'. Indeed, I will argue that nutrition is a unique medium that enables this kind of manipulation.

To develop this thesis in detail, I will bring together a number of related arguments in a multidisciplinary approach (Figure 1.1). As I will show, we can learn much about the relationship between malnutrition and ill-health by studying human physiology, or developing an evolutionary perspective, or examining the contribution of societal factors. One might assume that each of these contributes part of a broader picture, but
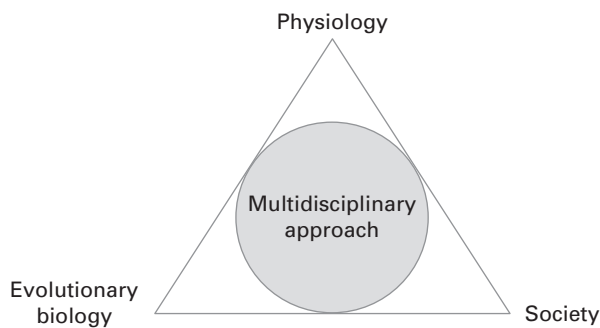
Figure 1.1.   The multidisciplinary approach adopted in this book.

the logic of a multidisciplinary approach is different: we need to *integrate* these three approaches, so that together they contribute more than the sum of their parts.

On this basis, I can explore how the organization of society shapes our health through nutritional mechanisms. If we can learn how 'wealth-power dynamics' generically shape our behaviour and physiology, then we can identify what capitalism does specifically in this context. I hope that this approach will offer a new perspective not only on malnutrition and chronic diseases, but also on capitalism itself.

Nutrition and power are always linked. If contemporary capitalist power relations are driving epidemics of obesity, diabetes, stroke and heart disease, we should not forget that the power relations of earlier eras drove chronic undernutrition and associated health penalties. It is as if history is cyclical, and that the fundamental problem of malnutrition is never solved – but this is no accident. I will start this book by showing how the control of food has long been used to coerce people, and that this scenario has persisted through the twentieth century and into the twenty-first. Bizarrely, this historical account will lead us directly to the emergence of public health nutrition. But we will also see that in the era of public health, far from dissolving the link between nutrition and coercion, we have actually magnified and diversified it.

Nutrition as a Tool of Control

To highlight a number of issues relevant to the nutrition–power nexus, I begin with a narrative of one particular period, when nineteenth-century European powers were engaging in the 'scramble for Africa'. The reason why I first focus on the Anglo-Boer War in this period will become clear shortly.

On 22 January 1879, British troops in southern Africa suffered a massacre at the Battle of Isandlwana. A force of 7000 men had recently invaded the kingdom of King Cetshwayo, attempting to put into effect a South African federation, like that already established in Canada. Standing in the way of this vision, the Zulu kingdom was the first target. Grossly underestimating the proficiency of their foe, the battle was a disaster for the British, with the death of over 1300 troops. To maintain face, however, a second

invasion with greater firepower followed a few months later, resulting in the defeat of Cetshwayo at the battle of Ulundi.[8]

Defeat at Isandlwana came as a sharp shock, for the scramble for Africa had previously resulted in the acquisition of vast tracts of territory at almost negligible cost in British lives. Only at Khartoum in 1885 had the demise of General Gordon and his garrison shown that incursions into African territory might be repelled with decisive military force. Since the unofficial start of the scramble in 1876, European powers had routinely conquered territories and populations with relative ease, initially through establishing opaque 'trading treaties' and then through the enforcement of their strategic aims at gunpoint. Even when Africans had access to firearms, such as matchlock and flintlock rifles, they remained at a major disadvantage against the early Gatling and Maxim guns that could generate the firepower of thirty individual rifles. In German East Africa in 1905, an armed rebellion was easily put down using machine guns, after which the troops celebrated the day's shooting with champagne. Artillery was regularly used to breach defended settlements, regardless of the indiscriminate loss of life.[9]

The Zulu kingdom did not recover, but within little more than a decade, British forces encountered a much graver setback when they attempted to invade the fledgling Boer republics of Transvaal and Orange Free State. The Transvaal with its gold mines was a notable jewel in the African crown: its incorporation within a southern African federation under the British flag would have been the climax to a twenty-year campaign to seize the greater slice of what King Leopold of Belgium had termed 'this magnificent African cake'.[10] Britain wanted a 'Cairo-to-Cape' railway, opening up the entire continent for 'trade' opportunities that would bring riches to the new capitalists, although substantially less to the indigenous populations.

This time the war lasted for three years and resulted in substantial loss of life on both sides. The Boers had modern rifles and were excellent marksmen, while the British troops were poorly prepared and suffered from high rates of infectious disease. The Boers initially scored several victories, and though they eventually lost formal control of their territory, resistance continued through guerrilla warfare. In response, the British adopted a scorched earth tactic, stripping the Boer farms of their stock animals and rounding up the families of the rebels for incarceration in concentration camps (Figure 1.2). To restrict guerrilla movements, the farmland was criss-crossed with barbed wire and concrete blockhouses, manned by African troops.

In the concentration camps, semi-starvation combined with endemic diseases such as typhoid, dysentery and measles to cause appalling mortality rates. The rations available for 'genuine refugees' were reduced in the case of women whose male kin were still fighting the British, so that undernutrition of civilians was deliberately used as a military strategy.[11] The total death toll of the war is estimated to have included ~14,000 Africans despite their not being the primary aggressors or defenders, ~20,000 British and ~7000 Boer men, and ~28,000 Boer women and children in the camps. The disproportionate mortality of women and children was noted by the future British prime minister David Lloyd George: 'The fatality rate of our soldiers on the battlefields, who were exposed to all the risks of war, was 52 per thousand per year, while the fatalities of women and children in the camps were 450 per thousand per year.'[12]

Figure 1.2.   A child dying of malnutrition in Bloemfontein concentration camp during the Anglo-Boer War. Wikimedia commons.

The Boer War represents a potent example of the fundamental connection between nutrition and power that lies at the heart of this book, but it is anything but unique. Elsewhere in Africa, alongside military force, mass starvation was widely used by European forces in the colonial era to defeat and subjugate indigenous populations. In southern West Africa, now Namibia, the German Imperial army rounded up thousands of rebellious Herero and left them to starve in the desert, and similar approaches were adopted in German East Africa, now Tanzania.[13] Through such activities, European nations were merely indulging in the application of modern technology to an age-old component of the empire-building toolkit: control of food represents control of people.

In ancient times, direct physical control of large populations was laborious and costly. A rare example is Hadrian's Wall, built from coast to coast across the north of England during the Roman era (Figure 1.3). For 250 years, the wall not only protected Roman territory from raids by the northern Picts, but also enabled taxation of those crossing the frontier in either direction.

Such physical barriers were generally non-viable, however, and armies could typically invade neighbouring territory relatively easily. To resist such physical oppression, early settlements developed fortifications in order to protect their populations. These had one fatal flaw: facing in both directions, walls made it easy for aggressors to impose the ultimate form of coercion, starvation.

Sieges and Starvation

Sieges and starvation have been used to exert social control for millennia in all major global regions. Already by 3500 BC, many of the small villages scattered across the

Figure 1.3.   Hadrian's Wall, built to separate the north of England from Scotland in the second century AD. Copyright of the author.

Indus Valley floodplain in south Asia had developed fortifications, showing that attacks on the food stores arising from early farming pre-dated the emergence of larger cities. In Scotland, numerous fortified farmsteads from the Iron Age can still be seen in the highlands and islands (Figure 1.4). These 'brochs' comprised double-walled stone towers that appear to have supported several internal floors, and may have belonged to elite farming families, combining a defensive role with the ability to signal status and wealth.[14]

Early urban settlements in the Middle East, Indus Valley and China all incorporated huge defensive walls to prevent plunder. Inside such defences, food reserves could be carefully stockpiled to withstand lengthy assaults. When an Arab army surrounded Constantinople (now Istanbul) from 717 to 718 AD, the Byzantine Emperor had sealed its granaries with sufficient food for up to three years.[15]

By and large, such early defences were physically successful. Walls of sun-baked bricks or wood generally proved impregnable, though the Spartan King Agesipolis ingeniously captured Mantinea in 385 BC by diverting a river into the city, dissolving the bricks back into mud. Starvation was usually the only feasible strategy of assault, and warfare was restricted to the summer months, so that the besieging army could live off the crops and animals outside the city walls. The balance of power shifted in favour of the attackers only with the invention of multi-storey siege towers in the fourth century BC. From these structures, troops could fire down at the defenders and gain access to the upper walls.

By the Roman era, siege warfare had evolved well-established techniques for attack and defence. For example, the end of the Gauls' resistance to the Romans

Figure 1.4.   Remains of the fortified Iron Age farmstead or 'broch' of Dun Telve from Glenelg, Scotland (dated 500 BC to 100 AD), showing (a) the well-defended entrance and (b) the thick outer wall. Copyright of the author.

came with the siege of Vercingetorix in the fort of Alesia, by Julius Caesar in 52 BC. Caesar walled his army in between inward fortifications facing the fort, and an outward stockade preventing the arrival of a relief force. Inside the fort, 80,000 defenders competed for food with many civilians, and though the soldiers eventually evicted the women and children, Caesar was unmoved and left them to starve in front of his lines. When the Gallic relief force was in due course annihilated, Vercingetorix had no option but to surrender.[16]

Individual sieges could be combined into a more sophisticated strategy. The Mongols sometimes sacked a number of smaller cities so that the refugees, falling back on a larger city, would deplete its food stores faster and hence accelerate its capitulation. They were also known to catapult plague corpses over the city walls, using disease to hasten the garrison's demise.[17]

Sieges were routine in medieval Europe, precipitating a surge in castle-building. Figure 1.5 shows the assault of William of Normandy on the motte-and-bailey castle of Dinan in the eleventh century AD, shortly before he invaded England. The only redeeming feature of this scenario was that since the castle was the primary objective, it was less common for entire cities to be surrounded and starved. Nevertheless, civilian populations were frequently caught up in blockades. In the siege of Rouen by the English in 1418, we get some idea of the consequences of food supplies failing among the
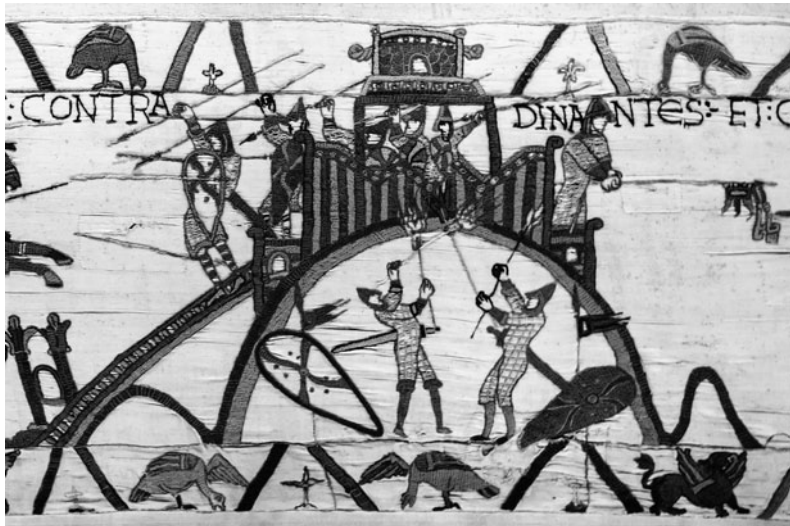
Figure 1.5.   Siege of the castle of Dinan by William of Normandy in the eleventh century AD, from the Bayeaux Tapestry. Wikimedia commons.

French defenders: 'They ate up dogs, they ate up cats, they ate up mice, horses and rats.' Cannibalism was not unknown during lengthier blockades. Other historical documents record how defeated defenders emerged with heads bowed, thin and deathly pale.[18]

Eventually, castles became redundant, too easily circumvented, or destroyed by modern artillery. In 1940, the defensive 'Maginot line' of forts in France was simply bypassed by mechanised German forces. But this offered no escape from the use of starvation as a weapon of war. Instead, in the twentieth century large cities once again became key battlegrounds because they were major centres of population and industrial activity, and because it was difficult to dislodge well dug-in troops. The Second World War reminds us that modern nations may still go to war over food, while using food restriction as a weapon of war.

Starvation in Modern Wars

In her book *The Taste of War*, the historian Lizzie Collingham described how the territorial aggression of Germany and Japan in the mid-twentieth century stemmed in large part from the desire of these countries to construct large agrarian empires in neighbouring countries, in order to gain independence within a global economic system that favoured the US and the British Empire.[19] As war broke out, nutrition became a key weapon on all sides.

After the end of the First World War, Britain had maintained a food blockade on Germany in order to force her to accept the unfavourable terms of the Versailles treaty. In the following decades, Hitler's National Socialist Party prioritized industrial independence,[20] while making plans to acquire huge areas of farmland (lebensraum)

to enable agricultural self-sufficiency. Central to these aims was the 'Hunger Plan' of the Minister for Food and Agriculture, Herbert Backe, who proposed to eliminate 30 million Soviet peasants, thus freeing up increased volumes of food for the German population. In 1941, Hitler explicitly proposed that 'what India was for England, the territories of Russia will be for us'.[21] Across the other side of the world, Japan had noted Germany's vulnerability to blockade, and made its own plans for a self-sufficient food economy. After invading Manchuria in 1931, Japan scaled up its acquisition of Asian territory in concert with Hitler's early conquests in Europe.

Food blockades were used throughout the war as a routine military tactic, at huge cost to civilian populations. Hunger was systematically exported by Germany and Japan to their occupied empires, while the Allied powers made extensive use of blockades to weaken their opponents' military capabilities. The distribution of food eventually influenced the outcome of the conflict in both Europe and the Far East. Japan had grossly miscalculated its vulnerability to naval blockade, and both its soldiers and its civilian population experienced starvation as the war progressed. Britain, in contrast, benefitted from the industrial might of the US, which built new merchant vessels faster than the German U-boats could sink them, and shipped vital supplies across the Atlantic. The height of Japanese children fell drastically during the war, whereas in Britain there was no detectable decline, and infant survival even improved.[22]

The 20 million civilian deaths attributable to starvation during this conflict exceeded the 19.5 million deaths from combat. While attention has deservedly been directed to the 6 million Jews liquidated in the Holocaust, civilians in general paid a horrific toll in many different countries. By the end of the war, around 11 per cent of the Greek population had starved to death, victims of the combination of an Allied blockade and German retribution for resistance activities. In the Soviet Union, millions died in besieged cities such as Leningrad, Stalingrad and Kharkov (Figure 1.6), prior to more intensive German efforts to eliminate the Jewish population and Soviet prisoners of war. In total, the war killed about 14 per cent of the pre-war Soviet population, equivalent to some 25–30 million individuals, of whom the majority were civilians dying most commonly from malnutrition. Nor were the combatant nations the only ones affected: by the end of the war, approximately one-third of the world's population was facing severe food shortages.[23]

From the second half of the twentieth century, the increasingly pivotal role of markets in food supplies has meant that rural and urban populations alike remain vulnerable to blockades. In the Nigerian Biafran war in the late 1960s, humanitarian organizations continued to find that most of those requiring medical aid were under-nourished civilians, especially children. In the absence of outright war, famine could still be co-opted to subjugate large populations, as for example by Stalin in the Ukraine (1932–3) when around 7 million peasants starved to death during the imposition of collectivization.[24]

In 1981, the economist Amartya Sen argued that famines were political rather than natural events, in the sense that they were failures of food distribution, not of food production. In 1996, a UN charter outlawed the control of food distribution for political