

Ultra-Processed Food, Depletion, and Social Reproduction: A Conceptual Intervention

Sara Stevano

*Department of Economics, SOAS University of London, London, UK,
ss129@soas.ac.uk*

Abstract: What we eat and how we think about food and nutrition are undergoing a momentous change, driven by the rise of ultra-processed food. There is a growing body of evidence linking the consumption of ultra-processed food to poor health outcomes. However, the health depleting effects of ultra-processed food go beyond changes in discrete indicators of nutrition and health. Processes of depletion entail social, economic, and political relations. This paper aims to emphasise the importance of a social science research agenda on ultra-processed food by establishing the conceptual connections between ultra-processed food and depletion using a social reproduction approach. To do this, it draws on the notion of depletion through social reproduction elaborated by Shirin Rai, Catherine Hoskyns and Dania Thomas, which provided inspiration to unpack the totality of social reproduction and consider specific resources needed for social reproduction. Such an approach reveals that ultra-processed food is both an input for social reproduction, through consumption, and a form of social reproduction work, when food work and the associated (health) care work are considered. On this basis, the paper identifies four conceptual dimensions to explore whether and to what extent the expansion of ultra-processed food can cause depletion and the key methodological principles to use this conceptual approach in empirical research.

Keywords: social reproduction, depletion, ultra-processed food, dietary change

Introduction

What we eat and how we think about food are undergoing a momentous change, driven by the rise of ultra-processed food. Ultra-processed foods are ready-to-eat and/or ready-to-heat products that combine food and non-food substances, often including cosmetic additives, through a series of industrial processes (Monteiro et al. 2019). Examples are carbonated drinks, packaged snacks, mass-produced bread, and instant noodles, among many others. What could be paradigm changing in nutrition thinking is that the focus on the type of processing of these foods marks a shift away from modern nutrition science's emphasis on nutrients as the primary indicator of food quality. It turns out that how food is processed may be more important than the nutrients it contains.

Mounting evidence links the consumption of ultra-processed food to poor health (Elizabeth et al. 2020; Lin et al. 2018; Popkin and Ng 2022). Some governments, particularly in countries where ultra-processed foods make up more than half of overall diets, are starting to consider whether and how they should

regulate the production and commercialisation of these products. However, in addition to being a major public health concern, ultra-processed foods raise important questions for social scientists that remain largely unasked and unaddressed to date. As a minority of food and nutrition scholars in the social sciences have sought to highlight for some time, food and nutrition are not just biomedical matters but fundamental social and economic issues.

This paper offers a conceptual intervention to consider the expansion of ultra-processed food from a social reproduction lens. To do so, it builds on the notion of depletion through social reproduction advanced by Shirin Rai, Catherine Hoskyns and Dania Thomas (2014) and further developed in Rai's [forthcoming](#) book. The concept is inspired by the language used in environmental accounts to capture the negative effects of economic activity on environmental quality, and it seeks to capture the uncounted costs of social reproduction (Hoskyns and Rai 2007; Rai et al. 2014). It proposes to compare the inflows and outflows of resources needed for social reproduction at the level of the individual, household, and community—the inflows are earnings, support networks, health and public provisioning; the outflows are captured by time spent on unpaid social reproduction work (Rai et al. 2014). When the outflows outweigh the inflows above a certain threshold of sustainability, the stock of resources available for social reproduction is too low and a process of depletion through social reproduction occurs. In other words, those involved in the work and practices of social reproduction face the deterioration of their physical and mental well-being.

While I do not use the equation nor the concept of depletion through social reproduction specifically as elaborated by Rai et al. (2014), their concept served as inspiration to focus on the resources that are needed for social reproduction. The intention of this conceptual intervention is to extend the notion of depletion in this direction, to unpack the resources needed for social reproduction and facilitate empirical investigation. Social reproduction is rightly conceptualised as a totality of work and practices that occur in both indeterminate and structured ways in the everyday and intergenerationally with the purpose of reproducing human life and capitalist relations (Katz 2001). This paper proposes that such a broad definition of social reproduction shall not be abandoned, but that it is unpacked for analytical purposes to consider specific aspects of the totality. In this way, we can analyse how changes in food consumption and, more broadly, in the food system shape the nature of social reproduction and the precise ways in which social reproduction gets squeezed, destabilised, and, ultimately, depleted.

The conceptual intervention is based on, first, connecting global food system transformation with the rise of ultra-processed food and depleted health. The role of the food industry as well as the emerging food and nutrition inequalities, occurring locally and globally, are emphasised to provide some elements of the socio-economic and political economy context. Following this, a social reproduction lens is introduced, which highlights key conceptual aspects that are illuminated by this perspective. Importantly, food is not considered only through the side of consumption, but food labour is also brought into the picture as a form of social reproduction work. Through this exploration, the paper aims to contribute to the understanding of ultra-processed food from a social reproduction lens, with

the hope of opening up a broader research agenda that recognises food as a fundamental element of social reproduction.

The Rise of Ultra-Processed Food

Since the beginning of the 20th century, modern nutrition science evolved to provide a *scientific* understanding of food by breaking it down to its abstract components: nutrients (Mozaffarian et al. 2018; Scrinis 2013). As nutrition became gradually detached from food as a whole and a pressing policy concern, especially since the 1930s crisis, attention shifted from the socio-economic determinants of hunger and food shortages to the problem of eating the wrong types of food (Sathyamala 2016). Nutrition science became a form of *nutritionism*, according to Scrinis (2013), marked by a reductionist focus on single nutrients, made possible through the isolation of vitamins and minerals that occurred in the first half of the 20th century (Mozaffarian et al. 2018). Up to the 1960s, attention was paid to the importance of protein intake; later, it turned to the harmful effects of some types of fat and carbohydrate; in the 1980s, it discovered that all fats are bad; and, since the 1990s, it returned to the idea that some fats and carbohydrates are good while others are bad amidst attempts, at present, to rehabilitate fats as good and instead label carbohydrates as bad (Scrinis 2013; van Tulleken 2023). Much as such an approach to food has helped us understand important aspects of its implications for health, it has also concealed crucial dimensions of diet and food practices. Modern nutrition science created an image of nutrition as a technical, biomedical, and individualised issue, which de facto crowded out social science perspectives on nutrition (Sathyamala 2016; Stevano 2021; Winson 2013).

Within such a landscape, in the early 2000s, a group of researchers in Brazil began to consider the limitations of focusing on nutrients and turned the attention to food processing as an alternative way of classifying food (Monteiro et al. 2010). They found that, between 1987 and 2003, diets in Brazil saw a decline in the consumption of minimally processed foods and an increase in the consumption of ultra-processed foods (henceforth UPFs), defined in this early study as ready-to-eat or ready-to-heat foods (ibid.). The displacing effect of UPF, which replaces minimally processed food, was duly noted—an argument that is now central in the current UPF literature. Accounting for how food is processed entails shifting the focus to how food is produced (Scrinis 2013), therefore linking food consumption back to its system of production and distribution (Bayliss and Fine 2020). Drawing inspiration from the food classification proposed by biochemist Ross Hume Hall in 2000, which was based on the type of processing, the use of chemical inputs, and the amount of fibre, Scrinis (2013) proposes a classification based on a more sophisticated approach to processing, capable of capturing when processing leads to a deterioration of food quality.

The rise of industrial food processing radically transformed the world's agri-food system (Reardon and Timmer 2012; Winson 2013). At first, it was driven by the emergence of large-scale processors, such as Bunge and Nestlé, large supermarkets and retailers, and large wholesale companies in the Global North (Reardon and Timmer 2012). Since the 1980s, with the imposition of liberalisation

and privatisation policies on many countries of the Global South, foreign direct investment in food processing and retail substantially increased, leading to fast-paced food system transformations in the Global South too (Hawkes 2006; Reardon and Timmer 2012; Scrinis 2016). The industrial diet became global through the spatial colonisation of the Global South (Winson 2013). As the sales of packaged food—a subset of processed food—grow globally, but especially in low- and middle-income countries (Reardon and Timmer 2012), the markets of African and Asian countries are now the frontier of food industry expansion (Baker and Friel 2016; Reardon et al. 2021; Scrinis 2016).

Food processing has been largely beneficial to increase the availability, affordability, and safety of food across the world (Reardon et al. 2021; Scrinis 2013; van Boekel et al. 2010). Further, the development of agri-food processing has also generated employment, not least for women (Reardon et al. 2021), although often offering poor working conditions to workers in the Global South (e.g. Ali and Stevano 2022; Rao and Dasgupta 2009). However, as the world's capitalist food system has become increasingly financialised and characterised by the concentration of corporate power (Clapp 2021; Keenan et al. 2023), it is critical to analyse how the food industry has used processing, why, and to what effect. Despite an initial proliferation of small and medium food-processing companies in middle-income countries, structural adjustment paved the way for mergers and acquisition through which larger processors acquired smaller ones (Reardon and Timmer 2012). The power of larger companies, often multinationals, liberalisation policies, the inflow of FDI, and regulation that disadvantaged smaller-scale actors led to stark concentration of corporate power in food processing (ibid.). By the 2010s, the ten largest global drink and food manufacturing companies¹ controlled approximately one quarter of the global packaged food markets (Scrinis 2016).

Against this backdrop, a type of processing that became dominant in the global food industry is ultra-processing. Ultra-processing starts with the industrial fragmentation of whole foods into sugars, oils, fats, starches, and fibres obtained through high-yield plant foods, such as corn, wheat, soy, and cane (Monteiro et al. 2019). These substances undergo chemical modifications and are then mixed with other modified or unmodified food substances as well as additives to improve the taste, smell, and appearance of the product (ibid.). A useful way to identify UPFs is to check if the ingredients of a food product contain one or more food substances that are not typically used in home cooking—examples are fructose, maltodextrin, dextrose, hydrogenated oils, soya protein isolate, gluten—and additives with cosmetic functions (ibid.). UPFs are currently defined through the NOVA classification system, which divides foods into unprocessed and minimally processed foods (group 1), processed culinary ingredients (group 2), processed food (group 3), and UPF (group 4) (see Martinez-Steele et al. 2023; Monteiro et al. 2019).² Examples of UPFs are carbonated soft drinks, packaged snacks, candies, margarines, poultry and fish nuggets and sticks, sausages, hot-dogs, certain breakfast cereals, instant soups and noodles, industrially-produced ice creams, bread, pastries, cakes, cookies, many ready-to-heat foods (Martinez-Steele et al. 2023; Monteiro et al. 2013, 2019). Ultra-processing is a catalyst for the

deterioration of food quality because it is based on the principle that cheap chemical substitutes of real food ingredients are used to make food (Monteiro et al. 2013; van Tulleken 2023; Winson 2013). As such, it is a core strategy for profit maximisation for the food industry because it decreases the costs of production, enhances the durability and palatability of food, and promotes brand differentiation (Monteiro et al. 2019; Wood et al. 2023).

Emerging research on financialisation and corporate power concentration in the UPF industry shows that the quest for ever bigger profits and power is rampant in the sector. Based on the study of US-listed food and agricultural corporations between 1962 and 2021, Wood et al. (2023) find that the UPF manufacturing sector and the food service sector, which includes fast-food restaurants dependent on UPF, are the two major distributors of shareholder value, having distributed 50% and 13% of the overall shareholder capital of about \$2.9 trillion (2021 US\$) in the observed period. The primacy of shareholder value is particularly stark in the UPF industry, as indicated by data showing that, since the 1990s, the UPF manufacturing sector and the food service sector have distributed a greater proportion of revenue to shareholders compared to the agricultural inputs, food retailers, and food producers sectors (ibid.). Further, a recent study of mergers and acquisition in the global food system between 2001 and 2020 finds that such deals occur largely horizontally, within the same sub-sector of the system, and the highest rates of concentration occurred within the sub-sectors that are central to the production and commercialisation of UPF (Keenan et al. 2023).

High short-term returns in the UPF industry are one underlying factor explaining the rapid expansion of UPFs globally. Sales of UPFs are highest in Australasia, North America, and Western Europe; in countries like the US, Canada, and the UK, UPFs make up more than half of total energy intake (Baker et al. 2020; Monteiro et al. 2019). Sales of ultra-processed beverages are very high in Latin America (Baker et al. 2020). Crucially, while sales of UPFs are lower in other regions of the world—e.g. East and South Asia, Africa, Central and Eastern Europe—they have been growing faster in these regions over the past decade (Baker et al. 2020), a trend explaining why these regions are the current frontiers of dietary change. Context-specific studies in the Global South document the rise in availability and consumption of processed and UPFs among children and adolescents, poorer strata of the population, among urban and rural residents, and in contexts affected by food insecurity.³ Cross-country studies using nationally representative household survey data from the World Bank's Living Standards Measurement Study in Nigeria, Tanzania, and Uganda indicate that dietary change in these countries entails a shift towards purchasing food, in particular of the unhealthy type (Dolislager et al. 2022).

Although the rise of UPF in lower-income contexts of the Global South might appear to paint a picture of global convergence, there are important aspects of differentiation in what types of UPFs are spreading and how (Baker et al. 2020). The variety of UPFs is higher in high-income countries, where these foods are mostly sold in supermarkets (ibid.). In lower-income countries, the UPF food industry makes widespread use of informal distribution channels and aggressive

marketing strategies (Baker et al. 2020; Stevano et al. 2020). The capillary availability of packaged and processed foods shapes the aspirations of the poorest, who are compelled to spend the occasional extra income on the only foods available in the local food outlets: primarily soft drinks and packaged snacks (Stevano 2021).

There is no doubt that the rise of UPFs is a significant trait of ongoing global food system transformations, with context-specific declinations—both in how these transformations are occurring and in their health, economic, social, and political implications. I now turn the attention to the connection between dietary change and depleted health.

Dietary Change and Depletion

The transition from a focus on nutrients to one on processing constitutes an epochal shift in nutrition thinking. Such a perspective is overwhelmingly driven by a concern over the health impacts of UPF. The evidence that links UPF consumption with rising obesity, diabetes, cardio-metabolic risks, cancer, cardiovascular diseases, irritable bowel syndrome, depression, and frailty conditions is growing (Elizabeth et al. 2020; Lin et al. 2018; Popkin and Ng 2022). Nonetheless, critics take issue with the lack of scientific evidence underpinning the NOVA classification (Petrus et al. 2021) and mixed evidence on the mechanisms through which UPF consumption would lead to poor health outcomes (Valicente et al. 2023), and contend that the problem with UPFs, or at least some of them, is that they are foods containing high quantities of bad fats, sugars, and salt, and little nutrients—thus, the problem is still nutrients, not processing (Robinson 2024). Amidst scientific debate, the food industry seeks to influence academic research, advisory panels, and policy making, as reported in the UK by the Soil Association (Percival 2023), BBC Panorama (Stallard 2023), and The Guardian (Jenkins 2023). It is beyond the scope of this paper to delve into these debates; however, two dimensions are critical from a social science perspective. First, the power of the food industry to appropriate and use to its advantage nutrition narratives is well documented—in fact, UPF development itself can be seen as part of the food industry response to health concerns while safeguarding or increasing shareholder value. Second, it is clear that ongoing dietary change is leading to depleted health in multiple ways—and UPF is at least a contributing factor in that it alters the quality of food. These issues are discussed in turn.

How the UPF Food Industry Rides on the Back of Single-Nutrient Nutrition Science

Alongside the processes of financialisation and corporate power concentration discussed in the previous section, the food industry used UPF development specifically as a response to nutrition concerns. As nutrition science pointed to health problems arising from excessive consumption of specific nutrients or the lack thereof, the food industry adjusted the composition of food accordingly, seeking to dissuade governments and regulatory bodies from introducing more restrictive

food regulations (Scrinis 2016). To this effect, the food industry has been active in lobbying politicians, funding scientific research, developing their own nutrition policies, enhancing their labelling, and partnering with public institutions to provide nutrition education and physical exercise programmes (ibid.). According to food regime scholars, since the 1980s, we have lived in the era of a corporate food regime (Friedmann 2005; McMichael 2009) that is not only dominated by corporate power in the food system, but where such power allows corporations to use and manipulate social, health, and environmental concerns to their advantage (Friedmann 2005). The food industry has positioned itself as a solution to the nutritional and health problems created through its own operations (Clapp and Scrinis 2017; Sathyamala 2016; Scrinis 2016; Stevano et al. 2020).

According to Scrinis (2016), the food industry's efforts to produce supposedly healthier foods can be categorised in three forms: (i) product reformulation; (ii) micronutrient fortification; and (iii) functionalisation. Reformulation is used to address overnutrition and obesity, and a typical example is reduced-fat products, which became popular at the time when fats were considered to be the most harmful nutrients (ibid.). A challenge posed by reformulation is to retain the palatability of food while changing its composition, which opens the door to modified food substances and additives (van Tulleken 2023). Micronutrient fortification is instead used to address micronutrient deficiencies; therefore it adds nutrients that are considered to be lacking (Scrinis 2016). Fortification can concern primary food production (e.g. orange-fleshed sweet potatoes) and final processing (e.g. vitamin-enriched instant noodles) and is now a ubiquitous intervention supported by several international and philanthropic organisations across the Global South (Hambloch et al. 2023). Finally, functionalisation entails using "optimal" quantities of certain micro-nutrients that can be used for marketing targeted to health-conscious higher-income consumers (Scrinis 2016). Since the 1990s, the food industry has de facto morphed into a nutraceutical industry that blends the nutritional and pharmaceutical properties of food (Sathyamala 2016).

Encompassing the various physical manipulations of food is the capacity of the food industry to appropriate nutrition narratives, flexing its instrumental and discursive power to its own advantage (Clapp and Scrinis 2017). Instrumental power is exercised through lobbying and public-private partnerships aimed at influencing policy decision-making (ibid.). An illustration of this type of initiative is Nestlé's Healthy Kids Programme in Ghana, which is based on a collaboration with the Ministry of Education and the Food and Nutrition Science Department at the University of Ghana and provides nutrition training to school teachers who would in turn teach their pupils about nutrition in the classroom (Stevano et al. 2020). Although the initiative does not promote Nestlé's products, it does use a branded kit as part of the nutrition lessons (ibid.). Such forms of corporate social responsibility are used by the food industry to set their own nutrition strategies and policies. Discursive power is instead exercised through appearances in the media and advertising (Clapp and Scrinis 2017). For example, PepsiCo differentiates its products in three categories: Good-for-You, Better-for-You, and Fun-for-You (ibid.). Our research in Ghana revealed that some food companies use nutrition messaging portraying their products as healthy even if they know that such labels are

not the main reason why consumers buy their products (Stevano et al. 2020). In addition, in countries where food companies face few if any restrictions to how and where they can advertise their products, it happens that the walls of schools and homes can be turned into living advertisements (Stevano 2021; Stevano et al. 2020).

The appropriation of nutrition narratives is a means for furthering the commercialisation of health promotion (O’Laughlin 2016). The lack of regulation or, in fact, deregulation processes have created ample space for the food industry to control and manipulate nutrition narratives as well as food—and such space may be bigger in poorer countries with weaker or more constrained state capacity.

Health Depletion

Malnutrition is a major public health issue worldwide. Hunger and food insecurity, determined by lack of availability or access to sufficient quantities of food, continue to plague the world’s food system (Global Nutrition Report 2022). In fact, the global food and nutrition crisis significantly deteriorated in the context of the Covid-19 pandemic, the war in Ukraine, and deepening climate change (Clapp and Moseley 2020; IPES-Food 2022). The concrete bottlenecks in food production and distribution are heightened by speculation on food markets, which makes the price of food highly volatile (van Huellen 2022). Overall, the world food system is vulnerable to crises and, in fact, crises at times originate in the agri-food system itself (Akram-Lodhi 2021), due to the capitalist restructuring that led to the concentration of crops, of countries producing grains for export, and of actors dominating grain and inputs markets (Clapp 2023).

The result is that the number of people affected by moderate or severe food insecurity increased by 25% in 2021, when a third of the global population (2.3 billion) was food insecure (Global Nutrition Report 2022). At the same time, consumption of too much food as well as the deterioration of food quality are leading to a growing epidemic of obesity and associated non-communicable diseases (NCDs) (ibid.). Although the drivers of obesity are multiple (Swinburn et al. 2011), it is increasingly clear that UPF is responsible for weight gain as well as a variety of poor health outcomes (Elizabeth et al. 2020; Lin et al. 2018; Popkin and Ng 2022). Thus, malnutrition has become an increasingly complex problem and, with obesity continuing to rise, the main driver of the global disease burden (Chong et al. 2023) or, in other words, health depletion.

Despite its pervasiveness, dietary change is an uneven process that produces unequal outcomes. For example, Africa stands out as the continent with the highest concentration of countries experiencing the simultaneous high prevalence of overweight, anaemia, and stunting—known as a triple burden of malnutrition (Global Nutrition Report 2020). While the sales of UPF and beverages in Africa are amongst the lowest in the world, they have been growing very fast (Baker et al. 2020), and these new foods are integrated in a food environment that has its own specificities, giving rise to a highly complex malnutrition and disease burden. In the case of a majority of African countries, the prevalence of chronic malnutrition and micronutrient deficiencies increasingly co-exist alongside the

growing prevalence of overweight and obesity and associated disease. For a quick comparison, South Asia is a region predominantly characterised by the high prevalence of anaemia and stunting, whereas North America, parts of South America, and Australia are affected primarily by overweight (Global Nutrition Report 2020). There are important regional differences in the nutrition outcomes of dietary change. Further, the spread of the obesity epidemic is highly uneven within countries too, with wealthier urban populations in lower-income countries and poorer populations in higher-income countries being the most affected (Perez-Escamilla et al. 2018; Swinburn et al. 2011). Thus, the health-depleting effects of dietary change are differentiated at the individual, household, and community levels.

Beyond direct health implications, dietary change and the rise of UPF in particular have socio-economic consequences via increased health expenditure. The increased incidence of NCDs in the world has gone hand-in-hand with increased health expenditure at the national level, with the highest expenditure attributable to cardiovascular diseases (Muka et al. 2015), which are related to diet and UPF consumption in particular. The impacts on national income occur not only through increased direct and indirect costs for the treatment of ill patients but also through lost capacity in the labour force (ibid.). At the same time, as public health care provision is declining globally, many have to resort to private health care and research shows that households affected by NCDs have higher out-of-pocket health expenditure.⁴

Dietary change is creating multiple burdens of malnutrition that, in turn, lead to the rise of diet-related NCDs. The increase in prevalence of such diseases is considered to be the main channel to health depletion. The depletion of health affects individuals, households, communities, and states in differentiated ways. However, a crucial blind spot remains. Depleted health emanates not only from discrete indicators of nutrition and disease, but also from social relations and processes that underpin the organisation of everyday life and intergenerational reproduction of life. In fact, it is only through shedding light on such relations and processes that we can fully understand not only health depletion but also the inequalities that are associated with and reproduced through such processes—this is the task of the next section.

Depletion *through* and of Social Reproduction via Ultra-Processed Food

An exploration of the social relations and processes embedded in the relationship between dietary change, the expansion of UPFs, and health depletion is missing to date, to the best of my knowledge. Such investigation would entail addressing a number of key questions, including: (i) How do UPFs shape food acquisition and consumption practices? (ii) How do UPFs shape the organisation of everyday life? (iii) How does the expansion of UPF influence (household) food production? (iv) How is the ensuing burden of disease managed by families, communities, and states? (v) How does UPF and its health consequences shape intergenerational practices of social reproduction? In other words, it is essential to understand how changes in the ways food is produced, processed, and consumed have

consequences for the management of disease burdens, the temporal dynamics of food practices, and the allocation of responsibilities in the world of food. It is not the intention of the paper to provide answers to these questions, but rather to highlight the importance of asking these questions—which means to consider how UPFs may be implicated in processes of depletion *through* and *of* social reproduction—and advancing a conceptual and methodological approach that can inform research on these issues.

Key Conceptual Issues

Although food is obviously a core component of social reproduction, the explicit analysis of food from a social reproduction lens is almost absent to date, barring a couple of notable exceptions (see Çelik 2023; Mincyte 2024). It is beyond the scope of this paper to articulate a broader conceptual connection between food and social reproduction; here I will focus specifically on how depletion may be triggered through the expansion of UPF. By taking a social reproduction approach, we see food as a resource for social reproduction, on the one hand, and food-related work as a form of social reproduction work, on the other. Food is a resource for social reproduction in that it sustains the reproduction of life through being consumed. In this sense, the quantity and quality of food is key because certain levels of healthy and nutritious foods are required to sustain life (FAO 2009). Trade-offs between food price and food quality, for instance, as well as the direct and indirect health implications of a deterioration in food quality shall be considered when seeing UPF through a social reproduction lens.

On the other hand, food-related work, which entails food production and processing, and food acquisition and preparation, are all forms of social reproduction work. Arguably, food production and processing for the market, whether on a small scale or in large-scale industrial agriculture, are forms of capitalist production that evidence how food is a commodity that lies at the interface between social reproduction and capitalist production. Therefore, both dimensions—food as a resource/commodity and food work—need to be taken into account to analyse the depleting effects of UPF expansion. With these two dimensions in mind, four conceptual insights will be discussed in turn: (i) how UPF shapes the organisation of everyday life; (ii) the implications it creates for the management of disease; (iii) how it influences the organisation of food labour; and (iv) the ecological implications of UPF expansion.

(i) *Organisation of Everyday Life*—UPF is not just integrated into existing diets and food practices, it contributes to transforming the modalities of food consumption. It is plausible—and scattered evidence documents this pattern (Andrade et al. 2020; Stevano et al. 2020; van Tulleken 2023)—that UPF is associated with consumption away from home and more individualised, rather than family or socially oriented consumption practices. Such shifts in consumption practices are intertwined with changing temporal and spatial rhythms of everyday life. The temporal dynamics of everyday life have intensified due to the absence of regular employment that pays living wages for the majority of the population and the associated fragmentation of work and family life across space, driven by

rural–urban and transnational migration, especially across the Global South (Cousins et al. 2018; Kunz 2010; Stevano et al. 2021). The rise of precarious and gig economy work—associated with growing rates of working poverty—is a key process underpinning the shifts in everyday use of time, space, and labour organising in the world (Bremen and van der Linden 2014; Lehdonvirta 2018). UPF shall be contextualised in the broader processes of spatial fragmentation of families and rhythms of work, to which it is both a consequence and a contributing factor.

The consumption of food that requires shorter or no preparation is faster by definition. Food ultra-processing presents an interesting puzzle from a social reproduction perspective because it could have different or conflicting consequences. On the one hand, processed food can have potentially beneficial effects on the use of time and income. Processed foods generally require less time for acquisition and preparation, alleviating the gendered responsibilities of feeding families, and are cheaper, a helpful condition for poorer families who also tend to be net food buyers (Aksoy and Isik-Dikmelik 2008). Yet, on the other hand, the worsening quality of food through ultra-processing is implicated in the degradation of resources for social reproduction, with potentially negative implications in terms of time, income, and health in the medium and long run, given that more resources for the provision of (health) care will have to be mobilised by families, communities, and governments. Thus, UPFs create important trade-offs in the organisation of everyday life that need to be assessed empirically. It shall be noted, however, that, while freeing up women's time may be intrinsically beneficial for women, if it opens up women's opportunities to participate in the labour market and earn incomes that can be used to buy poor-quality foods, there is a structural problem in the food system that needs to be addressed alongside gendered time constraints.

(ii) *Burden of Disease*—The management of diseases associated with UPF consumption has direct consequences for the individuals affected by ill health but also indirect consequences for those involved in providing care. As shown for other types of disease (see e.g. Johnston [2011] on HIV/AIDS), the social and economic impacts of poor health are much larger when the effects on those who may need to withdraw from education or work to provide care for an ill family member are taken into account. Especially where public health care provision is limited and access to private health care constrained by low incomes, the need to take care of an ill relative can be a significant cause of long-term interruptions of paid work (Stevano 2022). Crucially, as documented in much feminist literature, the practices and responsibilities of care provision for ill family members are highly gendered across the world (Himmelweit 1999; Razavi 2011). Those who carry out the social reproduction work of caring for ill relatives on an unpaid basis are at risk of depletion through social reproduction when the resources and/or conditions for their work fall below certain standards (Rai et al. 2014)—for instance, due to pressure on their time and exhaustion, or through income loss. Importantly, also those who perform the social reproduction work of caring for the sick on an un(der)paid basis may be at risk of depletion due to poor working conditions and the emotional demands of the job. The global shortage of nurses, a

sign or manifestation of the crisis of social reproduction, is caused by unsustainable workloads, burnout, and mental health problems (Smyth and Neville 2022).

The burden of disease has an economic cost for families and states, as discussed above. Such costs have been studied particularly in high- and middle-income countries but, in light of the unevenness in malnutrition burdens, it is urgent to investigate the economic implications of UPF expansion in contexts, such as the African continent, characterised by a triple burden of malnutrition (Global Nutrition Report 2020). These costs represent an additional strain through which depletion of households and public resources occurs, with implications for social reproduction.

(iii) *Food Labour*—Although UPF contains chemical non-food substances, it also includes food substances that derive from high-yield plants often grown in (large-scale) intensive monocultures (e.g. corn, soy, palm oil). The tendency to organise agricultural production around key export crops predates the emergence of UPF, but is further sustained through the expansion of UPF. Across the board, studies on labour in agricultural commodity chains show that work at the bottom of these chains can be especially exploitative as value is distributed away from primary agri-food production and processing (Ali and Stevano 2022; Baglioni 2022; LeBaron and Gore 2020; Selwyn 2014; Serrano 2023). In particular, as the workforce is differentiated, women and other workers from marginalised groups tend to cluster in the most precarious, informal, and irregular jobs in agri-food production and processing (Dancer and Sulle 2015). The devaluation of food labour is to be seen as part of the wider process of devaluation of social reproduction and, therefore, as another channel that can lead to the depleted well-being of food workers.

An aspect that remains largely overlooked so far are the implications for household production of food for own consumption. Such a dimension is particularly relevant for households and families with access to land and livelihoods reliant on home-grown food for family consumption in the Global South. The literature on UPF emphasises that UPFs have a displacing effect in that they tend to replace unprocessed and fresh food. Does the displacing effect concern not only consumption but also the organisation of agricultural production at the household level? As with the trade-offs on income and gendered time use highlighted above, the potential implications for declining importance or diversification of household food production may be seen in the medium to long term. However, so long as food production for own consumption is an insufficient but necessary condition for the social reproduction of the surplus populations that are adversely integrated into or excluded from capitalist production (Cousins et al. 2018; Ossome 2021; Stevano 2021, 2022), it is plausible that UPF may lead to changes in forms of household food production but not to its disappearance.

(iv) *Ecological Dimensions*—UPF may also be implicated in environmental depletion, which is another domain where harm can occur (Rai forthcoming). Social reproduction has an intrinsic ecological dimension in that the reproduction of non-human life is necessary to and interconnected with the reproduction of human life (Barca 2020; Moore 2015). Research on the environmental impacts of UPF is at a nascent stage and so far it shows that UPF is associated with intensive

agriculture and livestock, and poses threats to sustainability through the combination of low-cost ingredients, which promote drastic reduction in costs of production, and increased consumption (da Cruz et al. 2024; Fardet and Rock 2020). However, the carbon and water footprints of intensive agricultural production associated with UPF are comparable, if not higher, than those associated with meat and dairy production (ibid.). Nonetheless, it is argued that this research should evolve into considering the full environmental impacts of ultra-processing, in addition to the primary production of ingredients used in UPF (Seferidi et al. 2020). Importantly, when the compulsion towards the intensification of agriculture requires the increasing use of chemical inputs and long work hours in precarious conditions, the health of food workers and the reproduction of living labour comes under threat (O’Laughlin 2013, 2022).

In sum, UPF may be implicated in processes of depletion in various ways. Depletion *through* social reproduction may occur through the work of care for the sick that family members need to provide, largely on an unpaid basis, to manage the diseases associated with diets reliant on UPF. Depletion *through* social reproduction can also manifest in the health and agri-food sectors, where workers face high workloads, low pay, and physical and mental health issues. Further, building on Lingham and Johnston (2024), UPF can also be implicated in a process of depletion of social reproduction through the deterioration of food quality, the intensification of rhythms of life and ecological conditions of reproduction. Important trade-offs need to be considered as they may mitigate some of the depleting effects via increased income and reduced time spent on food preparation, especially in the short run. However, the structural conditions underpinning the expansion of UPF point to several concerns from a social reproduction perspective, which should be seen as integral to a social science research agenda on UPFs.

Methodological Considerations

The multi-dimensional nature of the conceptual issues discussed above points to the need for a methodological approach that enables the collection and/or use of different types of data, including qualitative and quantitative. Approaches that mix methods allow for a richer understanding of issues from different angles as well as for connecting observed phenomena with underlying causes (Downward and Mearman 2007). Further, a mixed-method approach can facilitate research motivated by the political purpose of challenging the status quo (Brannen 2005)—the expansion of UPF—and reversing harm (Rai forthcoming)—tackling the associated depleting effects.

In the original paper on depletion through social reproduction, Rai et al. (2014) point towards a quantitative approach to measuring depletion motivated by the desire to make visible the uncounted costs of social reproduction. Quantitative dimensions are important to investigate depletion that may be associated with UPF in terms of estimating the prevalence of UPF in diets, the incidence of diet-related diseases in a community or population of reference, time use, the pervasiveness of mental and physical health issues among certain workers, and the

magnitude of environmental depletion. However, it is also clear that the qualitative dimensions of the processes of depletion, including an analysis of trade-offs, may be better analysed through qualitative data and narratives that can capture the complexities of organisation of everyday life and work, including food practices, the experience of living with health issues as well as caring for ill people, and the centrality of ecology to social reproduction. A mixed-method methodology is necessary to investigate such quantitative and qualitative aspects of depletion through and of social reproduction via UPF.

Differently from nutrition data (collected regularly in most countries through the Demographic and Health Surveys and others), nationally representative data on food consumption and diets tend to be fragmented and lacking detail, often not including specific information on acquisition and consumption of UPF. As such, national-level consumption data are not well equipped to support the analysis of UPF consumption. The unavailability of these data underpins the choice of researchers to use data on sales of UPFs from paid databases, primarily the Euro-monitor International database, for cross-country studies (e.g. Baker and Friel 2016; Baker et al. 2020), and proxy categories of UPFs based on household budget surveys in certain countries (see e.g. Monteiro et al. [2010] on Brazil). There are two ways of overcoming this problem. First, as the NOVA classification for UPFs is becoming more established and recognised, it would be useful to include more questions on food intake and expenditure that refer specifically to UPFs in modules of nationally representative household surveys conducted on a regular basis. Further, these surveys should be adapted to better capture food consumption away from home, an issue that is already recognised in the literature (Farfan et al. 2015) and that is becoming more pressing as this type of consumption is on the rise. Second, there is a wide scope to engage in primary data collection on food consumption and food practices, both through small-scale surveys and qualitative research. Small-scale surveys allow for the collection of quantitative data based on more context-specific questions on food consumption. Qualitative research allows for a more holistic understanding of food practices and the division of food-related labour, which is necessary to understand how UPFs may shape the organisation of everyday life.

Another important methodological consideration that applies to social reproduction research in general (Mezzadri et al. [forthcoming](#)) pertains to the multi-scalar nature of social reproduction. The geographies of social reproduction refer to the political-economic, ecological, and cultural dimensions of the reproduction of labour across contexts and geographic scales (Katz 2001). The locations of social reproduction illuminate the connections between what occurs locally with global dynamics, or between micro-level everyday organisation of life and macro-level structural processes of change (Mezzadri et al. [forthcoming](#)). While social reproduction research may focus specifically on one level of analysis (e.g. the household or the community), it must be based on the premise that social reproduction exceeds that specific level or unit of analysis. In this sense, to capture the processes of depletion through and of social reproduction that may be triggered by the expansion of UPFs, it is necessary to consider individuals, their households and/or families and kinships, or networks of support, as well as the

state. Further, the organisation of food labour occurs locally, within households or communities, but also systemically with entire countries and regions of the world specialised in food production and/or processing for export. The fact the depletion can manifest at multiple levels was recognised by Rai et al. (2014), who highlight how the uncounted costs of social reproduction can be measured at individual, household, and community level—to which I add the state as well as the interconnections across these scales.

Specific recommendations on methodology will have to be put forward based on empirical practice and contextual specificities. However, the general principles advanced here indicate the importance of a mixed-method research design, the need for improved data on food consumption and for approaches that enable research at different scales.

Conclusions

Drawing on Rai et al.'s (2014) notion of depletion through social reproduction, I was inspired to unpack the totality of social reproduction to consider specific resources or components of social reproduction. The rise of UPF has been taken as a case in point to discuss how dietary change, and associated changes in the food system, may cause processes of depletion. Much evidence from nutrition and medical science is increasingly showing not only that UPFs are rapidly entering diets across the world, but also that they are responsible for a variety of diseases and health problems. It is becoming clearer that UPFs constitute a major public health concern. However, processes of health depletion are more than changes in discrete indicators of nutrition and health. These processes entail complex social, economic, and political relations. Having discussed the role of the food industry, in the broader context of agri-food system change, and the stark food and nutrition inequality that is emerging, this paper argued for the importance of understanding how UPF may trigger processes of depletion from a social reproduction lens.

The paper made a conceptual intervention by positing that food should be considered as a resource for social reproduction as well as a form of social reproduction when food-related work is considered. On this basis, it identified four conceptual dimensions to explore whether and to what extent the expansion of UPF can cause depletion. These are: (i) how UPF shapes the organisation of everyday life; (ii) how the burden of disease it creates is managed by individuals, households, communities, and the state; (iii) how it influences the organisation of food labour; and (iv) how it shapes the ecological conditions of food production and processing. Through these dimensions, it is possible to analyse how UPF may be implicated—under certain likely conditions—in processes of depletion through and of social reproduction. Against this backdrop, a methodological approach based on the principles of multiple data sources, improved food consumption data and capacity for multi-scalar engagement was advanced.

The contributions of the paper are two-fold. On the one hand, it foregrounds the importance for social scientists to take notice of the rise of UPF and start analysing how it matters from a social, economic, geographic, and political

perspective. It shall be regarded as a process of change with dramatic social implications and therefore it is urgent that a social science research agenda on UPF begins to expand to enrich current analyses of concentration of corporate power and financialisation in the UPF industry (e.g. Clapp and Scrinis 2017; Keenan et al. 2023; Wood et al. 2023). On the other hand, the use of a social reproduction lens to consider UPF points towards the need for a broader conceptualisation of the interconnections between food and social reproduction as a way to achieve a better understanding of both food and social reproduction and promote the advancement of an interdisciplinary social reproduction research agenda.

Acknowledgements

I extend my gratitude to the four anonymous reviewers whose meticulous work and invaluable feedback greatly enhanced the quality of this paper. Special appreciation goes to the editor and the guest editors of this Symposium, in particular Vincent Guermond, for their support throughout the publication process. I am also indebted to Shirin Rai for her insightful comments on earlier drafts. I acknowledge the support from SOAS Economics for funding a writing retreat, where significant portions of this paper were conceived and developed. Most importantly, my appreciation extends to all the research participants in Mozambique and Ghana, whose stories and experiences inspired the conceptual ideas presented in this paper.

Data Availability Statement

This is a conceptual paper but the data from related research conducted by the author are available on request.

Endnotes

¹ These companies are Nestlé, PepsiCo, Unilever, Coca-Cola, Mondelēz, Mars, Danone, Kellogg, Associated British Foods, and General Mills (Scrinis 2016).

² Examples of unprocessed foods are fruits, vegetables, fresh meat and fish, milk, eggs; processed culinary ingredients are vegetable oils, butter, sugar, honey; processed foods include tinned vegetables, dried or canned fish, bread, cheese, pastries, cakes, biscuits (when they do not contain modified food substances and/or additives) (Martinez-Steele et al. 2023).

³ See Guermond et al. (2023) on Cambodia; Sambu et al. (2024) and Stevano et al. (2020) on Ghana; and Stevano (2021) on Mozambique

⁴ See Joshi et al. (2013) on India; Pallegedara (2018) on Sri Lanka; and Wang et al. (2015) on Malawi.

References

- Akram-Lodhi A H (2021) Contemporary pathogens and the capitalist world food system. *Canadian Journal of Development Studies / Revue canadienne d'études du développement* 42(1/2):18–27
- Aksoy M A and Isik-Dikmelik A (2008) "Are Low Food Prices Pro-Poor? Net Food Buyers and Sellers in Low-Income Countries." World Bank Policy Research Working Papers <https://elibrary.worldbank.org/doi/abs/10.1596/1813-9450-4642> (last accessed 19 March 2024)

- Ali R and Stevano S (2022) Work in agro-industry and the social reproduction of labour in Mozambique: Contradictions in the current accumulation system. *Review of African Political Economy* 49(171):67–86
- Andrade G C, Gombi-Vaca M F, da Costa Louzada M L, Azeredo C M and Levy R B (2020) The consumption of ultra-processed foods according to eating out occasions. *Public Health Nutrition* 23(6):1041–1048
- Baglioni E (2022) The making of cheap labour across production and reproduction: Control and resistance in the Senegalese horticultural value chain. *Work, Employment and Society* 36(3):445–464
- Baker P and Friel S (2016) Food systems transformations, ultra-processed food markets, and the nutrition transition in Asia. *Globalization and Health* 12 <https://doi.org/10.1186/s12992-016-0223-3>
- Baker P, Machado P, Santos T, Sievert K, Backholer K, Hadjidakou M, Russell C, Huse O, Bell C, Scrinis G and Worsley A (2020) Ultra-processed foods and the nutrition transition: Global, regional, and national trends, food systems transformations, and political economy drivers. *Obesity Reviews* 21(12) <https://doi.org/10.1111/obr.13126>
- Barca S (2020) *Forces of Reproduction: Notes for a Counter-Hegemonic Anthropocene*. Cambridge: Cambridge University Press
- Bayliss K and Fine B (2020) *A Guide to the System of Provision Approach: Who Gets What, How, and Why*. London: Palgrave Macmillan
- Brannen J (2005) “Mixed Methods Research: A Discussion Paper.” ESRC National Centre for Research Methods (NCRM) Methods Review Papers <https://eprints.ncrm.ac.uk/id/eprint/89/> (last accessed 19 March 2024)
- Breman J and van der Linden M (2014) Informalizing the economy: The return of the social question at a global level. *Development and Change* 45(5):920–940
- Çelik C (2023) Global food insecurity as a crisis of social reproduction for the classes of labour. *Human Geography* 16(2):193–199
- Chong B, Jayabaskaran J, Kong G, Chan Y H, Chin Y H, Goh R, Kannan S, Ng C H, Loong S, Kueh M T W, Lin C, Anand V V, Lee E C Z, Chew H S J, Tan D J H, Chan K E, Wang J W, Muthiah M, Dimitriadis G K, Hausenloy D J, Mehta A J, Foo R, Lip G, Chan M Y, Mamas M A, le Roux C W and Che N W S (2023) Trends and predictions of malnutrition and obesity in 204 countries and territories: An analysis of the Global Burden of Disease Study 2019. *eClinicalMedicine* 57 <https://doi.org/10.1016/j.eclinm.2023.101850>
- Clapp J (2021) The problem with growing corporate concentration and power in the global food system. *Nature Food* 2(6):404–408
- Clapp J (2023) Concentration and crises: Exploring the deep roots of vulnerability in the global industrial food system. *Journal of Peasant Studies* 50(1):1–25
- Clapp J and Moseley W G (2020) This food crisis is different: COVID-19 and the fragility of the neoliberal food security order. *Journal of Peasant Studies* 47(7):1393–1417
- Clapp J and Scrinis G (2017) Big food, nutritionism, and corporate power. *Globalizations* 14(4):578–595
- Cousins B, Dubb A, Hornby D and Mtero F (2018) Social reproduction of “classes of labour” in the rural areas of South Africa: Contradictions and contestations. *Journal of Peasant Studies* 45(5/6):1060–1085
- da Cruz G L, da Costa Louzada M L, da Silva J T, Garzillo J M F, Rauber F, Rivera X S, Reynolds C and Levy R B (2024) The environmental impact of beef and ultra-processed food consumption in Brazil. *Public Health Nutrition* 27(1) <https://doi.org/10.1017/s1368980023002975>
- Dancer H and Sulle E (2015) “Gender Implications of Agricultural Commercialisation: The Case of Sugarcane Production in Kilombero District, Tanzania.” Future Agricultures Working Paper 118 <https://www.future-agricultures.org/publications/working-papers-document/gender-implications-of-agricultural-commercialisation-the-case-of-sugarcane-production-in-kilombero-district-tanzania/> (last accessed 19 March 2024)
- Dolislager M, Liverpool-Tasie L S O, Mason N M, Reardon T and Tschirley D (2022) Consumption of healthy and unhealthy foods by the African poor: Evidence from Nigeria, Tanzania, and Uganda. *Agricultural Economics* 53(6):870–894

- Downward P and Mearman A (2007) Retroduction as mixed-methods triangulation in economic research: Reorienting economics into social science. *Cambridge Journal of Economics* 31(1):77–99
- Elizabeth L, Machado P, Zinöcker M, Baker P and Lawrence M (2020) Ultra-processed foods and health outcomes: A narrative review. *Nutrients* 12(7) <https://doi.org/10.3390/nu12071955>
- FAO (2009) “State of Food Insecurity 2009.” Food and Agriculture Organization of the United Nations
- Fardet A and Rock E (2020) Ultra-processed foods and food system sustainability: What are the links? *Sustainability* 12(15) <https://doi.org/10.3390/su12156280>
- Farfan G, Genoni M E and Vakis R (2015) “You Are What (and Where) You Eat: Capturing Food Away from Home in Welfare Measures.” World Bank Policy Research Working Papers <https://documents.worldbank.org/en/publication/documents-reports/document-detail/269121467991958460/you-are-what-and-where-you-eat-capturing-food-away-from-home-in-welfare-measures> (last accessed 19 March 2024)
- Friedmann H (2005) From colonialism to green capitalism: Social movements and emergence of food regimes. In F H Buttel and P McMichael (eds) *New Directions in the Sociology of Global Development* (pp 227–264). Leeds: Emerald
- Global Nutrition Report (2020) “2020 Global Nutrition Report.” Development Initiatives Poverty Research <https://globalnutritionreport.org/reports/2020-global-nutrition-report/> (last accessed 19 March 2024)
- Global Nutrition Report (2022) “2022 Global Nutrition Report.” Development Initiatives Poverty Research <https://globalnutritionreport.org/reports/2022-global-nutrition-report/> (last accessed 19 March 2024)
- Guermond V, Iskander D, Michiels S, Brickell K, Fay G, Ly Vouch L, Natarajan N, Parsons L, Picchioni F and Green W N (2023) Depleted by debt: “Green” microfinance, over-indebtedness, and social reproduction in climate-vulnerable Cambodia. *Antipode* <https://doi.org/10.1111/anti.12969>
- Hall R H (2000) *The Unofficial Guide to Smart Nutrition*. London: John Wiley & Sons
- Hambloch C, Mausch K, Conti C and Hall A (2023) Simple solutions for complex problems? What is missing in agriculture for nutrition interventions. *Food Security* 15 (2):363–379
- Hawkes C (2006) Uneven dietary development: Linking the policies and processes of globalization with the nutrition transition, obesity, and diet-related chronic diseases. *Globalization and Health* 2 <https://doi.org/10.1186/1744-8603-2-4>
- Himmelweit S (1999) Caring labor. *Annals of the American Academy of Political and Social Science* 561(1):27–38
- Hoskyns C and Rai S M (2007) Recasting the global political economy: Counting women’s unpaid work. *New Political Economy* 12(3):297–317
- IPES-Food (2022) “Another Perfect Storm?” International Panel of Experts on Sustainable Food Systems https://ipes-food.org/_img/upload/files/AnotherPerfectStorm.pdf (last accessed 19 March 2024)
- Jenkins S (2023) Banning ultra-processed food is not a nanny-state issue. It’s common sense. *The Guardian* 9 June <https://www.theguardian.com/commentisfree/2023/jun/09/banning-ultra-processed-food-nanny-state-common-sense> (last accessed 20 March 2024)
- Johnston D (2011) Bias, not error: Assessments of the economic impact of HIV/AIDS using evidence from micro studies in sub-Saharan Africa. In C Conrad and C R Doss (eds) *AIDS, Gender, and Economic Development* (pp 95–124). London: Routledge
- Joshi A, Mohan K, Grin G and Perin D M P (2013) Burden of healthcare utilization and out-of-pocket costs among individuals with NCDs in an Indian setting. *Journal of Community Health* 38:320–327
- Katz C (2001) Vagabond capitalism and the necessity of social reproduction. *Antipode* 33 (4):709–728
- Keenan L, Monteath T and Wójcik D (2023) Hungry for power: Financialization and the concentration of corporate control in the global food system. *Geoforum* 147 <https://doi.org/10.1016/j.geoforum.2023.103909>

- Kunz R (2010) The crisis of social reproduction in rural Mexico: Challenging the “re-privatization of social reproduction” thesis. *Review of International Political Economy* 17(5):913–945
- LeBaron G and Gore E (2020) Gender and forced labour: Understanding the links in global cocoa supply chains. *Journal of Development Studies* 56(6):1095–1117
- Lehdonvirta V (2018) Flexibility in the gig economy: Managing time on three online piece-work platforms. *New Technology, Work and Employment* 33(1):13–29
- Lin T K, Teymourian Y and Tursini M S (2018) The effect of sugar and processed food imports on the prevalence of overweight and obesity in 172 countries. *Globalization and Health* 14 <https://doi.org/10.1186/s12992-018-0344-y>
- Lingham J T and Johnston M (2024) Running on empty: Depletion and social reproduction in Myanmar and Sri Lanka. *Antipode* <https://doi.org/10.1111/anti.13016>
- Martinez-Steele E, Khandpur N, Batis C, Bes-Rastrollo M, Bonaccio M, Cediel G, Huybrechts I, Juul F, Levy R B, da Costa Louzada M L, Machado P P, Moubarac J C, Nansel T, Rauber F, Srour B, Touvier M and Monteiro C A (2023) Best practices for applying the Nova food classification system. *Nature Food* 4(6):445–448
- McMichael P (2009) A food regime genealogy. *Journal of Peasant Studies* 36(1):139–169
- Mezzadri A, Rai S and Stevano S et al. (forthcoming) Pluralising social reproduction approaches. *International Journal of Feminist Politics*
- Mincyte D (2024) Rethinking food regime as gender regime: Agrarian change and the politics of social reproduction. *Journal of Peasant Studies* 51(1):18–36
- Monteiro C A, Cannon G, Levy R B, Moubarac J C, Louzada M L C, Rauber F, Khandpur N, Cediel G, Neri D, Martinez-Steele E, Baraldi L G and Jaime P C (2019) Ultra-processed foods: What they are and how to identify them. *Public Health Nutrition* 22(5):936–941
- Monteiro C A, Levy R B, Claro R M, de Castro I R R and Cannon G (2010) Increasing consumption of ultra-processed foods and likely impact on human health: Evidence from Brazil. *Public Health Nutrition* 14(1):5–13
- Monteiro C A, Moubarac J C, Cannon G, Ng S W and Popkin B (2013) Ultra-processed products are becoming dominant in the global food system. *Obesity Reviews* 14 (S2):21–28
- Moore J W (2015) *Capitalism in the Web of Life: Ecology and the Accumulation of Capital*. London: Verso
- Mozaffarian D, Rosenberg I and Uauy R (2018) History of modern nutrition science: Implications for current research, dietary guidelines, and food policy. *The BMJ* 361 <https://doi.org/10.1136/bmj.k2392>
- Muka T, Imo D, Jaspers L, Colpani V, Chaker L, van der Lee S J, Mendis S, Chowdhury R, Bramer W M, Falla A, Pazoki R and Franco O H (2015) The global impact of non-communicable diseases on healthcare spending and national income: A systematic review. *European Journal of Epidemiology* 30:251–277
- O’Laughlin B (2013) Land, labour, and the production of affliction in rural Southern Africa. *Journal of Agrarian Change* 13(1):175–196
- O’Laughlin B (2016) Pragmatism, structural reform, and the politics of inequality in global public health. *Development and Change* 47(4):686–711
- O’Laughlin B (2022) No separate spheres: The contingent reproduction of living labor in Southern Africa. *Review of International Political Economy* 29(6):1827–1846
- Ossome L (2021) The care economy and the state in Africa’s Covid-19 responses. *Canadian Journal of Development Studies / Revue canadienne d’études du développement* 42(1/2):68–78
- Pallegedara A (2018) Impacts of chronic non-communicable diseases on households’ out-of-pocket healthcare expenditures in Sri Lanka. *International Journal of Health Economics and Management* 18(3):301–319
- Percival R (2023) Sticky fingers of food industry on government ultra-processed food review. *Soil Association* 11 July <https://www.soilassociation.org/blogs/2023/july/11/sticky-fingers-of-food-industry-on-government-ultra-processed-food-review/> (last accessed 20 March 2024)

- Perez-Escamilla R, Bermudez O, Buccini G S, Kumanyika S, Lutter C K, Monsivais P and Victora C (2018) Nutrition disparities and the global burden of malnutrition. *The BMJ* 361 <https://doi.org/10.1136/bmj.k2252>
- Petrus R R, do Amaral Sobral P J, Tadini C C and Gonçalves C B (2021) The NOVA classification system: A critical perspective in food science. *Trends in Food Science & Technology* 116:603–608
- Popkin B M and Ng S W (2022) The nutrition transition to a stage of high obesity and noncommunicable disease prevalence dominated by ultra-processed foods is not inevitable. *Obesity Reviews* 23(1) <https://doi.org/10.1111/obr.13366>
- Rai S (forthcoming) *Depletion: The Costs of Care and Struggles to Reverse It*.
- Rai S M, Hoskyns C and Thomas D (2014) Depletion: The cost of social reproduction. *International Feminist Journal of Politics* 16(1):86–105
- Rao N C and Dasgupta S (2009) Nature of employment in the food processing sector. *Economic and Political Weekly* 44(17):109–115
- Razavi S (2011) Rethinking care in a development context. *Development and Change* 42(4):873–903
- Reardon T and Timmer C P (2012) The economics of the food system revolution. *Annual Review of Resource Economics* 4:225–264
- Reardon T, Tschirley D, Liverpool-Tasie L S O, Awokuse T, Fanzo J, Minten B, Vos R, Dolislaiger M, Sauer C, Dhar R, Vargas C, Larrey A, Raza A and Popkin B M (2021) The processed food revolution in African food systems and the double burden of malnutrition. *Global Food Security* 28 <https://doi.org/10.1016/j.gfs.2020.100466>
- Robinson E (2024) Ultra-processed foods: Here's what the evidence actually says about them. *University of Liverpool News* 16 January <https://news.liverpool.ac.uk/2024/01/16/ultra-processed-foods-heres-what-the-evidence-actually-says-about-them/> (last accessed 20 March 2024)
- Sambu W C E, Picchioni F, Stevano S, Codjoe E A, Nkegbe P K and Turner C (2024) Food systems thinking unpacked: A scoping review on industrial diets among adolescents in Ghana. *Food Security* 16(1):79–114
- Sathyamala C (2016) Nutritionalizing food: A framework for capital accumulation. *Development and Change* 47(4):818–839
- Scrinis G (2013) *Nutritionism: The Science and Politics of Dietary Advice*. New York: Columbia University Press.
- Scrinis G (2016) Reformulation, fortification, and functionalization: Big Food corporations' nutritional engineering and marketing strategies. *Journal of Peasant Studies* 43(1):17–37
- Seferidi P, Scrinis G, Huybrechts I, Woods J, Vineis P and Millett C (2020) The neglected environmental impacts of ultra-processed foods. *The Lancet Planetary Health* 4(10) [https://doi.org/10.1016/S2542-5196\(20\)30177-7](https://doi.org/10.1016/S2542-5196(20)30177-7)
- Selwyn B (2014) Capital–labour and state dynamics in export horticulture in north-east Brazil. *Development and Change* 45(5):1019–1036
- Serrano A (2023) Restructuring palm oil value chain governance in Colombia through long-term labour control. *Journal of Agrarian Change* 23(3):547–567
- Smyth J and Neville S (2022) Covid, burnout, and low pay: The global crisis in nursing. *Financial Times* 2 June <https://www.ft.com/content/402df6ca-5098-40ca-9cc8-bae331c39398> (last accessed 20 March 2024)
- Stallard E (2023) Could ultra-processed foods be harmful for us? *BBC News* 5 June <https://www.bbc.co.uk/news/health-65754290> (last accessed 20 March 2024)
- Stevano S (2021) Marx and the poor's nourishment: Diets in contemporary sub-Saharan Africa. In A Mezzadri (ed) *Marx in the Field* (pp 175–188). London: Anthem Press
- Stevano S (2022) Classes of working women in Mozambique: An integrated framework to understand working lives. *Review of International Political Economy* 29(6):1847–1869
- Stevano S, Ali R and Jamieson M (2021) "Essential Work: Using a Social Reproduction Lens to Investigate the Re-Organisation of Work During the COVID-19 Pandemic." SOAS Department of Economics Working Paper No.241 <https://eprints.soas.ac.uk/35135/> (last accessed 20 March 2024)

- Stevano S, Johnston D and Codjoe E (2020) Better decisions for food security? Critical reflections on the economics of food choice and decision-making in development economics. *Cambridge Journal of Economics* 44(4):813–833
- Swinburn B A, Sacks G, Hall K D, McPherson K, Finegood D T, Moodie M L and Gortmaker S L (2011) The global obesity pandemic: Shaped by global drivers and local environments. *The Lancet* 378(9793):804–814
- Valicente V M, Peng C H, Pacheco K N, Lin L, Kielb E I, Dawoodani E, Abdollahi A and Mattes R D (2023) Ultra-processed foods and obesity risk: A critical review of reported mechanisms. *Advances in Nutrition* 14(4):718–738
- van Boekel M, Fogliano V, Pellegrini N, Stanton C, Scholz G, Lalljie S, Somoza V, Knorr D, Jasti P R and Eisenbrand G (2010) A review on the beneficial aspects of food processing. *Molecular Nutrition & Food Research* 54(9):1215–1247
- van Huellen S (2022) Inflation: How financial speculation is making the global food price crisis worse. *The Conversation* 29 November <https://theconversation.com/inflation-how-financial-speculation-is-making-the-global-food-price-crisis-worse-191056> (last accessed 20 March 2024)
- van Tulleken C (2023) *Ultra-Processed People: Why Do We All Eat Stuff That Isn't Food...and Why Can't We Stop?* London: Penguin
- Wang Q, Fu A Z, Brenner S, Kalmus O, Banda H T and De Allegri M (2015) Out-of-pocket expenditure on chronic non-communicable diseases in sub-Saharan Africa: The case of rural Malawi. *PloS ONE* 10(1) <https://doi.org/10.1371/journal.pone.0116897>
- Winson A (2013) *The Industrial Diet: The Degradation of Food and the Struggle for Healthy Eating*. New York: New York University Press
- Wood B, Robinson E, Baker P, Paraje G, Mialon M, van Tulleken C and Sacks G (2023) What is the purpose of ultra-processed food? An exploratory analysis of the financialisation of ultra-processed food corporations and implications for public health. *Globalization and Health* 19 <https://doi.org/10.1186/s12992-023-00990-1>