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The nexus between international trade, food systems, malnutrition and climate change

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Trade agreements are a major determinant of the operation of food systems. Here, we examine how different aspects of trade can constrain or enable governments' ability to implement food system-level actions aimed at enhancing nutrition and mitigating climate change. Concerning technical aspects, we focus on the potential impact of trade agreements on three major strategies for transforming food systems—namely the removal of market barriers for agricultural commodities, the protection of regulatory policy space and the revision of subsidies. Concerning non-technical aspects, we review the evidence on the political economy of trade to show that coherence between trade-policy goals and public-interest goals, such as nutrition and climate change, involves actors' interests, ideas, and formal and informal institutional processes at various levels. With international agreements to liberalize trade and investment being binding, and recommendations to address malnutrition and climate change being non-binding, there is potential for trade to hinder efforts against malnutrition and climate change. Tempering this will require a deeper understanding of the complex trade–food system–nutrition–climate nexus and a new regulatory framework consistent with such complexity, as well as strategic stakeholder engagement.

Food systems, which are at the heart of pressing societal challenges including malnutrition and climate change, are heavily influenced by trade-related changes to domestic policy and product environments—in both positive and negative ways. This interaction between trade, malnutrition and climate change has been amplified in the last decades by the shift towards industrial food systems, with global supply chains owned and operated by large or transnational agribusinesses, manufacturers, retailers and food service chains[1]. If global malnutrition and climate change are to be addressed, it is vital to understand their link with trade agreements and how these can be improved to support a nutritious, equitable and environmentally sustainable food system. While there is a growing body of evidence related to trade, food systems and malnutrition, what remains absent from the literature is an examination of the current understanding of the ways in which the technical and political aspects of trade agreements interact with food systems to affect malnutrition and climate change. Here, we review the literature connecting trade and food systems to show how major technical and political aspects of such relationships may affect malnutrition and climate change (Fig. 1). We aim to elucidate how the technicalities of trade, through different types of agreements and provisions, sit alongside the political economy of trade policy. In doing so, we also highlight the opportunities and challenges of creating nutrition- and climate-sensitive trade policy.

The Review starts with an overview of the global food trade regime and the technicalities of how trade agreements interact with policies aimed at improving malnutrition and climate change. It then focuses on the political and policy processes surrounding trade agreements that can enable or constrain attention to malnutrition and climate change. Global and national policy windows for connecting trade, nutrition and climate change mitigation are highlighted at the end, as well as how public interest actors must work to ensure policy coherence towards those goals.

The global trade regime

Established in 1995, the World Trade Organization (WTO) governs the multilateral trade rules among its 164 member countries[2] and presides over 24 multilateral trade agreements. These agreements cover a wide range of binding obligations on issues including trade in services (General Agreement on Trades in Services; GATS), Trade-Related aspects of Intellectual Property rights (TRIPS), Technical Barriers to Trade (TBT), agriculture (the Agreement on Agriculture; AOA) and a dispute settlement system[3].

Through these trade agreements, member states are required to open their markets, including agri-food markets, by reducing tariffs and non-tariff barriers to imports, reducing subsidies for exports and reducing domestic agricultural support. WTO rules promote the global integration of markets and provide a favourable operating environment for the private sector. These liberalization policies and agreements have enabled the rapid expansion of the industrial food system[4].

The WTO cemented two fundamental principles of the international trade regime: progressive liberalization (that is, furthering commitments) and non-discrimination (that is, equal treatment for equal goods and services). Unless otherwise specified, all trade and investment provisions are premised on these principles (see Supplementary Table 1 for an overview of trade and investment liberalizing structures). Since the establishment of the WTO, tariff rates in many countries have reached all-time lows, trade flows have increased, and there has been a major reorganisation and integration of goods production on a global scale[5].

The multilateral trade system has declined in favour over time in light of decreased returns for high-income countries, an ongoing stalemate between countries in the multilateral Doha development agenda, and the shifting balance of economic power between countries and regions. Moreover, social, political and technological advancements since the early 1990s have meant that the original WTO agreements have not kept pace with the needs of globalising economies. In response, regional trade agreements and bilateral investment treaties emerged, sitting outside the multilateral trading rules, and have evolved from the exchange of raw materials and final goods between countries into a complex 'trade-investment-service nexus'[6].

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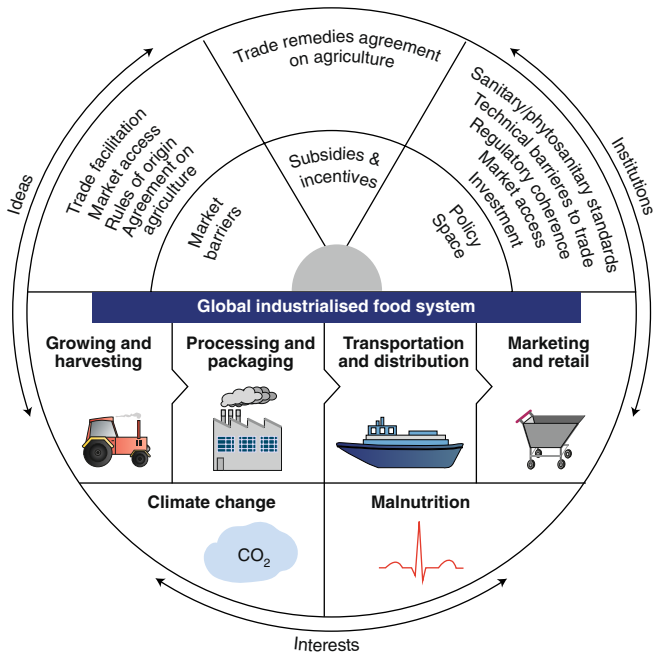

Fig. 1 | The trade–food system–nutrition–climate nexus.

Box 1 | Recommendations from the Lancet Commissions

Lancet Commission on the global syndemic of obesity, undernutrition and climate change[23]

(1) Reduce red meat consumption
(2) Develop sustainable dietary guidelines
(3) Introduce right to wellbeing legislation, including right to food
(4) Restrict commercial influences in health policy
(5) Promote a global framework convention on food systems

The EAT–Lancet Commission on healthy diets from sustainable food systems[24]

(1) Seek international and national commitment to shift towards healthy diets
(2) Re-orient agricultural priorities from producing high quantities of food to producing healthy food
(3) Sustainably intensify food production to increase high-quality output
(4) Promote strong and coordinated governance of land and oceans
(5) At least halve food loss and waste

These new forms of trade agreements go beyond import tariffs and non-tariff barriers at the border, and increasingly include measures focused on domestic policy, rules and regulations through matters of intellectual property, health and safety rules, labour standards, investment measures, investor-state dispute settlement procedures and others[7]. The inclusion of these types of measures have increasingly empowered a set of politically well-connected firms including international banks, pharmaceutical companies and multinational firms[7]. Today's complex international trade regime can affect malnutrition and climate change in various ways[8], including via food systems.

Implications of trade liberalization for food systems, malnutrition and climate change

Analysing how the rules of trade affect governments' ability to implement food-system-level actions for nutrition and climate change mitigation can help identify possible areas of incoherence between binding trade agreements and other legitimate aims of government[9].

International agreements to liberalize food-related trade and investment are legally binding. In contrast, international agreements and policy recommendations for action to address malnutrition and climate change are forms of soft-law and are non-binding. This tension between binding and non-binding agreements creates the potential for trade and investment agreements to trump national and global efforts to improve malnutrition and climate change[10].

There is a limited literature of systematic reviews and analyses of specific trade agreements identify various ways in which trade liberalization can affect food systems[11–22]. Three key pathways emerge from this literature: trade in raw or finished food commodities; increased foreign investment in domestic production, manufacturing and distribution of foods; and influence on regulatory policy space.

Sitting alongside the trade and food systems literature are two major research reports, the Lancet Commission on Obesity[23] and the EAT–Lancet Commission[24], which synthesize the global literature and examine various ways in which food systems affect malnutrition and climate change. Both reports recommend a number of food-system-focused actions targeted at more sustainable food systems and healthier diets.

We reviewed the range of strategies suggested by the Lancet Commission on Obesity[23] and the EAT–Lancet Commission[24] (Box 1) as a means of implementing the recommended actions. We identified that trade agreements could enable or hinder three of the types of strategy identified by the Lancet commissions—namely removing market barriers for agricultural commodities from low- and middle-income countries (LMICs); protecting regulatory policy space; and revising subsidies. The following section shows how the technicalities of trade agreements (including trade and investment chapters and provisions within trade) would intersect with each of these three strategies, and what impacts might arise.

Removing market barriers in the agri-food sector. The removal of market barriers for agricultural commodity trading is an important strategy for reducing food loss and food price volatility, particularly in LMICs[25]. Food price and availability are key factors that influence food security and undernutrition. Trade agreements include a number of opportunities to reduce market barriers and ease the flow of agri-food products across borders. First, market access provisions in trade agreements seek to lower or reduce tariffs (that is, border taxes) on goods, which will make those goods cheaper for the importer and, in turn, increase the volume and diversity of goods in the importing country[26]. Within the WTO, the AOA governs market access for agricultural commodities, and includes additional rules on domestic support and export subsidies. Second, the rules of origin within an agreement establish the criteria needed to decide the nationality of a product and thus determine the range of goods that will benefit from reduced tariffs. More restrictive rules of origin (for example, requiring more percentage of the product be grown, or processed, in the exporting country) mean fewer products will benefit from tariff liberalization, hence reducing the effects of tariff reductions[27]. Third, trade facilitation rules seek to reduce the time- and country-specific requirements for products to cross borders, subsequently supporting an increased flow and diversity of agro-food trade[28]. These three components—market access (including the AOA), rules of origin and trade facilitation—work in concert to determine the cost and level-of-ease of moving agricultural commodities across borders.

Although the quantifiable effects of reducing market barriers on food loss have not yet been studied, considerable literature has explored the impact of trade on food security, including price volatility, in LMICs. A review of 34 studies from 1990–2010 found that 13 reported improvements in food security and 10 reported declines, while another 11 reported mixed outcomes across varying population segments, regions and time[29]. The lack of clear evidence is attributed to "the diverse metrics and techniques used to measure food security outcomes following trade reform, the difficulty of isolating agricultural trade liberalization effects from those of broader economic reforms, and the different 'starting points' in countries when trade reform occurs"[29]. The impacts of liberalization specific to price were equally unclear, sometimes showing a substantial decrease after liberalization and sometimes a substantial increase. However, prices were considered to play a central role in determining how food security metrics are affected by trade liberalization, in particular on vulnerable populations[29].

Enhancing market access to reduce food loss and price volatility must not undermine progress on healthy diets. The trade system has been suggested to preference unhealthy, highly-processed food products[30], in part due to their enhanced transportability, long shelf lives, high profit margins, and suitability to marketing and advertising (which is essential to brand differentiation and capturing market share in foreign countries). For example, tariff reductions in the North American Free Trade Agreement (NAFTA) between the United States, Canada and Mexico coincided with an increase in the supply of caloric sweeteners, including high-fructose corn syrup, in Canada[31]. Reduced tariffs have also been associated with increased processed food supply and consumption in urban areas[32] and across Central and Latin America, Africa, Southeast Asia and the Pacific[33–36].

Both the EAT–Lancet Commission[24] and Lancet Obesity Commission[23] highlighted the importance of decreasing animal-source food production and consumption in light of greenhouse gas emissions and land and water use. However, they equally acknowledge the importance of animal production and consumption in some communities to support ecosystems, poverty alleviation and nutritional status, thus advocating context-specific solutions.

Research has shown that animal producers in high-income countries actively lobby their governments and trade ministers for improved access to new and emerging markets to support increased production and exports[37]. In turn, tariff reductions have been associated with an increased supply of animal products across Central and Latin America, Africa, Southeast Asia and the Pacific[33–36]. Inevitably, actions to limit animal production will run counter to the aims and objectives of trade liberalization as it currently operates. However, the multilateral trade system introduced post-World War II was designed in response to the major global challenges of the time: the need to rebuild infrastructure and societies, and integrate economies to prevent future war. Arguably then, the trade and investment system should once again be responding to the major challenges of our day: climate change and malnutrition. Market access chapters in trade agreements could be utilised to reintroduce the import and export quotas they once abolished in order to provide a context-oriented approach for reducing production of animal products, and equitably shaping distribution, at the global level.

Protecting regulatory policy space. A number of recommended actions by the Lancet Commissions[23,24] require protecting policy space to regulate for healthy and sustainable diets. Specific measures noted include zoning regulations to restrict unhealthy food outlets in low-income areas, marketing and advertising restrictions on unhealthy and unsustainable foods, and protecting the precautionary principle in policymaking. A number of key provisions in trade agreements can protect or restrict regulatory policy space.

One of the fundamental protections for health and environmental policy space in trade agreements is within the WTO General Agreement on Tariffs and Trade (GATT). Known as the general exception, members may adopt measures that violate GATT if it is 'necessary to protect human health, animal or plant life or health' (Article XX[b]) or 'relating to the conservation of exhaustible natural resources' (Article XX[g]) provided they do not constitute a means of arbitrary or unjustifiable discrimination between countries, or a disguised restriction on trade. Where the GATT provides market access for goods through tariff reductions, the GATS opens up new service sectors within a country to foreign direct investment (FDI) and reduces constraints on foreign ownership in domestic sectors (for example, removes limits of less than 50% foreign ownership).

FDI contributes to the restructuring of food production, processing, distribution and retailing by transnational food and beverage companies[38], thereby altering both the food retail and marketing environments. The same general exception is included in GATS, thus providing health and environmental exceptions to market access in both goods and services. However, concerns have been raised about the effectiveness of this protection in practice, and the utility of importing it into new regional and bilateral agreements, after a 2015 report revealed only one of 44 attempts to invoke Article XX, or the equivalent provision in GATS, had ever been successful. In the 33 cases where the exception was deemed to be relevant, the majority (18 cases) failed to establish that measures were 'necessary to' or 'related to' protecting health or conserving natural resources[39].

Both the Sanitary and Phytosanitary Standards (SPS) agreement and the TBT agreement are extensions of the GATT and introduce potentially restrictive requirements into domestic policy arenas. The SPS requires measures to protect human, animal or plant life or health be balanced against the goal of facilitating and expanding trade. Measures are presumed to be consistent with the SPS and GATT if they conform to international standards (for example, the *Codex Alimentarius*). Alarmingly, the majority of non-governmental observers to the so-called 'Codex' are industry actors, raising concerns about the influence of multinational food companies in these standard-setting bodies.

In the event that national measures are more stringent than international standards, then states are required to demonstrate that the first are scientifically justified and based on a risk assessment. The SPS has thus been surrounded by discussion of the precautionary principle, which "asserts that the burden of proof for potentially harmful actions by industry or government rests on the assurance of safety and that when there are threats of serious damage, scientific uncertainty must be resolved in favour of prevention"[40]. The dispute settlement body of the WTO, while recognising the right of members to establish their own appropriate level of sanitary protection, has ruled that a precautionary approach must be applied in a manner consistent with the agreement and risk assessment techniques developed by the relevant international organizations[41], throwing the practical functionality of the precautionary principle in the WTO system into question.

The TBT agreement aims to ensure that domestic technical regulations, standards and conformity assessment procedures are non-discriminatory and not more trade-restrictive than necessary to fulfil a legitimate objective. Legitimate objectives include the protection of human health or safety, animal or plant life or health, or the environment[42]. As with the SPS, measures are considered compliant with obligations if they are based on relevant international standards. The TBT Committee is considered a type of informal dispute settlement, where members can raise specific concerns regarding measures that may affect their trade. Previous analyses have shown how nutrition labelling measures have been raised as a trade concern within the TBT Committee, with other member states demanding greater justification for the measures and

scientific evidence for their effectiveness. Some have also suggested that the measures are more trade-restrictive than necessary, and that less trade-restrictive measures, such as education campaigns, could be implemented instead[43].

Regulatory coherence chapters are relatively new in trade agreements and largely address the policymaking process. They introduce requirements on the level of transparency in the regulatory policy process, and enshrine rights to participation for private actors—such as public provision of documentation on all domestic regulatory measures, interagency consultation and coordination mechanisms for regulatory measures, regulatory impact assessments for proposed regulations, and periodic review of domestic regulatory measures. Provisions also ensure opportunities for interested persons to provide input on matters relevant to enhancing regulatory coherence, and that such input will be taken into account in developing measures[44]. The impacts of these chapters remain unknown, and would be likely to vary depending on the policymaking processes in a country, as well as the balance of participation across industry actors.

Finally, investment promotion and protection in trade agreements, including Investor-State Dispute Settlement (ISDS), has been one of the most heavily watched spaces in terms of domestic regulatory policy space. This section of an agreement outlines the set of rights that a host state must provide to foreign investors. This includes the right to fair and equitable treatment and the right for compensation in the case of direct or indirect expropriation. Most agreements also enable foreign investors to sue states within which they have invested if government measures negatively impact the value of their investment. This is enabled through the ISDS[45]. A 2013 review of 196 ISDS claims found that 40 involved health or environmental protection, including measures concerning food safety, water and land-use, pollution control and hazardous waste[46]. The success of these cases has been mixed to date (see ref. [47] for review). International attention to the issues around ISDS has brought significant reforms to the system, such as a proposed court system to address conflicts of interest and other deficiencies in process, and more comprehensive public welfare protections. For example, the Peru–Australia Free Trade Agreement[48] has clarified that "No claim may be brought under this Section [ISDS] in relation to a measure that is designed and implemented to protect or promote public health." The large range of policies captured here, and the absence of the 'necessity' language (that is, requiring that a measure be designed to protect health rather than the higher threshold set by a measure being necessary to protect health), likely make this the most extensive protection for public health in dispute settlement in any trade agreement.

Technically, trade agreements do not prevent the implementation of the recommendations from the Lancet Commissions[23,24] regarding zoning regulations, marketing and advertising restrictions, and the use of the precautionary principle—although they may impede policy efforts at times. Established protections like the general exception have raised concerns in terms of utility, but greater attention to issues such as ISDS are resulting in superior protections, such as that found in the Peru–Australia agreement. Less visible spaces like the TBT Committee, or backdoor policy channels created by regulatory coherence, are important to watch. Arguably, the protection of health measures has made more progress in this space and equivalent attention to climate change measures is needed.

Revising subsidies. The EAT–Lancet Commission[24] recommended the revision, or removal, of a series of subsidies. These include subsidies on fertilisers, water, fuels, electricity and pesticides that refrain prices from reflecting the true cost of food; subsidies to world fisheries that lead to over-capacity of the global fishing fleet; and revision of biofuel subsidies that divert food to energy use.

In the WTO system, subsidies are governed by the Agreement on Subsidies and Countervailing Measures, which establishes rules for the use of trade remedies to protect domestic industries from unfair, trade distorting practices of other trading partners and from surges in imports that cause harm to domestic producers. Outside the WTO these have been referred to as 'trade remedies'. If a subsidy is found to be prohibited (for example, contingent on export performance or the use of domestic over imported goods), or not prohibited but targeted at a particular industry or region causing adverse effects to other members, then the WTO system can be used to challenge those subsidies. The caveat is for agricultural goods, which are covered by the AOA, and exempts certain amounts and types of subsidies from the Agreement on Subsidies and Countervailing Measures. For instance, while one form of biofuel—biodiesel—is considered an industrial product and thus not exempt from subsidy rules, ethanol is considered an agricultural product and is therefore protected by the AOA (that is, subsidies are permitted).

Under the AOA, domestic support is divided into different boxes according to its trade-distorting effects. Amber box subsidies are the most trade-distorting (for example, guaranteed market or tax exemptions). Members agree to cap their annual total expenditure on this type of subsidy and to reduce this over time. If a WTO member exceeds this value in any year, it may be challenged. Green box subsidies have no (or minimal) trade-distorting effects and members have no requirement to limit or reduce these payments. Keeping with our biofuels example, regions or countries that heavily subsidise these industries, such as the United States (US$10.7–12.9 billion in 2008)[49] or the European Union (US$7.2–9.0 billion in 2011)[50], are likely to try and classify as much of that subsidy as possible under the green box so as not to count against their annual amber box values. It has been alleged that government subsidies have supported biofuel industries where such businesses would not otherwise have been commercially viable, and that there is little evidence that domestic policymakers have taken into account WTO rules when crafting these policies[51]. The inclusion of food security and environmental programmes under green box categories, however, could support actions recommended by the Lancet Commission to introduce incentives for landholders to undertake land restoration projects, incentives for protecting natural areas (such as forests) and incentives for primary producers to produce nutritious plant-based foods.

The political economy of trade

Besides the technicalities of trade, it is important to understand the actors and institutional barriers to, and opportunities for, greater coherence between trade policy goals and nutrition and climate goals. Notably, there appears to be more literature related to trade, food systems and nutrition than there is to trade, food systems and climate change. We draw on the '3–i' political science framework, which shows that policy developments are shaped by actors' interests and ideas, mediated through institutions[52]. We apply this framework to recent scholarship on the political and governance factors shaping attention to, or neglect of, malnutrition and climate change matters in trade policymaking at national, regional and global levels.

Interests. Interests refer to the agendas of groups of actors, for example, elected officials, industry and civil society. As the issue of trade highlights, and as noted throughout the two Lancet Commissions[23,24], many of the needed policy actions to improve malnutrition and climate change fall outside the health and climate portfolios, requiring coordinated actions across many sectors, at multiple levels, within and outside of government. Fundamentally, this raises issues of power, with government priorities and decisions influenced by the interests of powerful policy actors and the strategies they adopt to advance their interests[53–55].

Scholarly research shows that asymmetries between powerful interests are prominent in the trade regime. At the global institutional level, the WTO was not actively engaged in debates on malnutrition prior to the global food crisis, but has since emerged as a "legitimate and authoritative voice on food security, enabling greater influence over the global agenda"[56]. Since the 2008 food crisis, the WTO Director General participates in food security debates alongside the heads of United Nations Food and Agriculture Organisation (FAO) and the World Food Programme, while WTO officials work alongside international food and finance officials on policies for food prices and agricultural markets at the G8 and G20[56]. Thus, the interests of neoliberal trade actors have received greater attention in global food governance. Even though many trade-related rules have significant implications for climate change, trade interests have received little explicit attention in climate governance. Climate change has not been part of the core business of the WTO, and the WTO has had little involvement within the United Nations Framework Convention on Climate Change talks, maintaining instead the pursuit of environmental-related discussions within the multilateral negotiations[57].

LMICs have challenged the dominant trade liberalization goal for malnutrition, particularly food security, most recently through the Doha round of negotiations at the WTO[58]. Since the 2008 food crisis, low-income countries in many Asian and African countries have commenced or expanded public food stockholding of essential staples such as rice and wheat to support domestic food security. This has prompted clashes over whether such measures infringe trade rules, pitting "trade liberalization against special and differential treatment for developing countries and the idea that food and agriculture are unique and require alternative arrangements in the trade regime"[59]. In 2013, India, China and Brazil, along with a wider group of developing countries, were successful in obtaining a temporary waiver for public food stockholding from WTO disputes even if they violated rules on agricultural spending[60]. For Margulis[60] this suggests changing power dynamics amongst states with different interests and opportunities for increased attention to malnutrition needs of LMICs into the future.

Differences in power also exist between government portfolios and departments. For example, in Malaysia, health officials reported a broader lack of consultation with trade officials and reliance on leaked text to identify potential health concerns. Similarly, in Australia, health officials have reported power imbalances with trade officials, making them reliant on trade officials to identify whether a trade agreement might affect measures for diet-related non-communicable diseases control[61].

In contrast to industry actors, the voice of public-interest actors, including nutrition and climate action groups, is generally much weaker in trade negotiations, often kept at a distance and with little or no access to the proceedings. In contrast, trade negotiations privilege industry actors, including powerful food and fossil fuel companies, who often have the ear of trade negotiators through formal and informal mechanisms. This serves to elevate export interests (for example, sugar, ultra-processed foods and fossil fuels) as a key focus of trade negotiators, with limited prioritisation of commodity value in terms of nutrition, climate change or net benefit for the economy[62,63].

Ideas. How food issues are defined and framed through ideas—knowledge or beliefs about what is and/or what ought to be—in the context of trade negotiations influences the degree of attention they receive. Framing is a widely recognised ideational strategy used by actors to focus attention on particular issues[64]. Successful framing is "adopted as talking about new ways of understanding issues"[65] and dominant framings can become so widely accepted that they are taken for granted as self-evident truths.

Internationally, the dominant framing in trade policy remains a neoliberal market framing, which emphasises competitive markets, continuing export growth including agricultural export growth and deregulation[61,62,66–69]. The logic of neoliberalism promotes export growth of commodities with no attention to whether such goods improve malnutrition (through for example, ultra-processed foods) or mitigate climate change[62,68,70].

Within this market framing, agri-businesses have advanced attention to food safety through phytosanitary measures, while discussions of food security, diet-related NCDs and climate-sensitive agriculture have been largely excluded from the discourse[66,71–73]. Analyses of trade policy in Australia, for example, demonstrates that the dominance of a 'productivist' paradigm which emphasises agricultural exports and market growth over nutrition objectives has influenced the continuing low salience of nutrition in trade policy[67]. Policy actors working at the nexus of trade and health have also reported the dominance of an 'individual responsibility' framing amongst trade policymakers, which perceives the problems of obesity and NCDs as primarily one of demand and individual behaviour rather than a problem of supply facilitated by trade agreements[61]. Ideational barriers to advancing nutrition and climate change on national trade agendas also include the lack of a clear narrative of the linkages between nutrition, climate change and trade, and a lack of substantive and coherent advocacy for these issues at national levels[61,67].

Market-focused ideas about food and trade liberalization at the WTO have permeated into institutions like the FAO[58]. Analyses of FAO and WTO documents over an extensive period have shown a shift in FAO framing of food security since the 1980s and 1990s as one towards trade liberalization as a solution, underpinned by assumptions of comparative advantage between countries exporting a range of commodities, such as food[58,74]. As Clapp argues[72], the food sustainability agenda in global food governance arrangements has become 'trade-ified', with international trade rules framed as a key mechanisms for the environmental sustainability of food systems, through promises of greater efficiency.

There has also been the emergence of 'food sovereignty' counter frames from social movements and LMICs, promoting self-sufficiency and local food systems based on principles of environmental sustainability and nutrition[74]. Claims for food sovereignty have intensified in response to the WTO's AOA and its rules for domestic agricultural policies, which many low-income countries perceive as potentially constraining efforts at ensuring food security[75]. To date, however, alternative framings for food security have been successful in bringing together movements of resistance across countries and generating greater dialogue about the purpose of global food trade, but largely unsuccessful in substantively shifting the dominant trade and agricultural regime[72].

Institutions. Institutions can be defined as "the formal and informal rules, norms, precedents, and organizational factors that structure political behaviour"[52]. Nutrition and climate change actors have reported constraints on their ability to engage in the policy development processes with trade policymakers. Barriers identified at the national level include limited opportunities for consultation and input, lack of transparency around trade agreement negotiations, and a broader lack of public deliberation about the social, environmental and health impacts of trade agreements[61,67,76].

An analysis of Australian trade policy reveals the formal and informal institutions that different policy actors, such as agribusiness and civil society actors, use inside and outside trade negotiations to pursue their interests[77]. These include 'inside' processes, such as interdepartmental committees, or informal mechanisms, such as attending trade negotiation rounds. Institutional processes 'outside' the negotiations are also used, again through formal channels such as parliamentary inquiries, or informal processes such as

lobbying ministers or building networks. Public interest actors have reported more difficulties in gaining access to trade negotiators than industry actors, and use a variety of mechanisms outside the system, such as using leaked negotiating text to survey what issues might be on the table. However, a lack of transparency around trade negotiations limits the meaningful engagement of nutrition- and climate-concerned actors in these institutional processes, both inside and outside the system[77].

Research has also highlighted institutional asymmetries between countries negotiating trade agreements, in particular for LMICs. Capacity for negotiation of trade agreements is expensive and skills-intensive, requiring infrastructure that small and poorer countries struggle to find[78]. Further, as low-income countries are drawn into technical agreements, such as the WTO's SPS Agreement, the evidence shows a lack of scientific capacity to evaluate the potential costs or benefits to food systems, malnutrition or related climate change effects[78].

Conclusions and future directions

Trade agreements can, and do, interact with actions across the food system aimed at improving malnutrition and climate change in various ways. Achieving a trade policy that promotes healthy and sustainable food systems is not a straightforward technical matter. Policy decision-making processes are highly complex through interaction among the state, private sector and civil society, and involving a mix of interests, institutional processes and power asymmetries. What then are the key opportunities moving forward in terms of trade, food systems, malnutrition and climate change, and how might the inevitable challenges be overcome?

The global policy arena. A number of important political discourses and policy initiatives taking place at the global level are positive for nutrition and climate change mitigation. The 17 Sustainable Development Goals (SDGs) set forth by the United Nations (UN) constitute an agenda for action over 2015–2030, designed to promote peace and prosperity, eradicate poverty, and 'heal the planet'[79]. One of the SDGs aims explicitly to end hunger and all forms of malnutrition by 2030[79].

The UN General Assembly has also proclaimed the UN Decade of Action on Nutrition from 2016 to 2025, with UN agencies and states committed to reducing malnutrition and the burden of NCDs[80]. One of the six action areas is "trade and investment for improved nutrition". Major policy initiatives like these provide important windows of opportunity, with a direction from the highest level of the UN to national governments and UN agencies to work out how to ensure coherence between trade and nutrition policy goals.

Less positive are the recent shifts taking place within the global trade regime. As noted earlier, a structural recalibration of trade rules, scope and reach is taking place through the development of many regional and bilateral trade and investment agreements (which sit outside the rules of the WTO). The current and emerging trade focus of greater economic integration and strengthened private investor protections suggests a major win for transnational corporations, and signals that commerce will continue to be prioritized over public interests including nutrition and climate concerns[81]. At the political level, the international trade regime had a shock recently with the United States, under President Trump, withdrawing from the Trans-Pacific Partnership Agreement. This increase in anti-globalisation and pro-nationalism has arisen not only in the United States but also in Britain, with the vote to exit the European Union, and across much of the West. Such protectionist regimes would place restrictions on trade and thus potentially affect food supplies and food security[82]. Mistrust of international treaties generally, including those for climate change, will undermine the Paris Agreement.

However, it has recently been noted that, though international politics and changes to global trading relationships pose unpredictability, trade is unlikely to contract and its impact on food systems, malnutrition and climate change will remain critical to analyse[21]. Deepening our understanding of this current friction in trade policy can enable public-interest actors to strategically engage and achieve better outcomes for nutrition, climate change and food systems[83].

Governance for healthy trade. Key to addressing these global policy tensions and working towards greater policy coherence is improved governance of policy-making processes[84]. As the previous section highlights, there is still much work required among the global institutions to identify shared agendas, ways of engaging and complementary policies that will enhance synergies and manage risks between trade policy and healthy and sustainable food systems.

But there are instances of successful governance of policymaking at the national level. Thailand is one positive example of a country focusing on coherence between trade and health. Thailand's Ministry of Health has established an international health scholar program to build up individual capacity on global health. It has also created the International Trade and Health Programme between a number of government departments to strengthen institutional capacities and generate evidence-based policy decisions. These programs have built-in international networks to exchange and share information, and created an enabling environment to strengthen health officials' capacities to focus on trade-related issues[85]. In Ghana, collaboration between the trade and health sectors was also found to be a key driver in the successful food standards policy[86]. In response to rising imports of low-quality and high-fat meats in the 1990s, Ghana implemented standards that applied to all domestic and imported meats, thus ensuring their policy was compliant with Ghana's trade commitments at the WTO to be non-discriminatory and evidence-based[86].

These examples, and other literature, highlight actions that are critical to improve trade governance with respect to malnutrition and climate change objectives. First, there must be greater understanding among nutrition and climate change actors about the role of trade policy as both a barrier and potential catalyst for improved nutrition and climate outcomes. Second, much greater transparency of trade negotiations is needed to ensure that nutrition and climate actors can engage effectively in the negotiations. Third, to be effective in pushing for more policy space for nutrition and climate change within trade agreements, the relevant public interest actors must be able to engage with economists and lawyers on their terms and in their language.

What about the evidence?. An interdisciplinary approach is needed to understand and address the tensions between trade, nutrition, and climate objectives and outcomes. Yet, many gaps remain in the empirical evidence on the relationships between trade, food systems malnutrition and climate change. Filling those gaps requires collaboration between trade, climate and food-policy experts. Drawing on methodological toolkits from systems science and policy analysis would help.

In terms of the political economy, much of the literature has focused on barriers (neoliberalism, structures that benefit agribusiness and power imbalances between states at WTO), with relatively little analysis of what has worked well and why. The global food systems, malnutrition and climate change research community can build on salient lessons from other policy issues, such as trade, access to medicines and tobacco control, showing how actors have successfully elevated attention to these issues on trade agendas, nationally and globally. Here, political science analyses would give hope that, despite long odds, recalibrating the power inequities in the global trade regime may be possible through a variety of approaches, including compelling issue framing and

discursive strategies, coalition building, social mobilization and institutional strategies.

Taking an interdisciplinary and intersectoral approach to issues of global social significance can help shine some light on pathways forward. This includes the identification of structural changes needed within the trade regime to reduce malnutrition and mitigate climate change, identification of reasons why those changes have not taken place and understanding how public-interest actors must work to achieve the necessary changes.

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Competing interests

The authors declare no competing interests.

Additional information

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