Proceedings of the Nutrition Society

cambridge.org/pns

The Nutrition Society of Australia 2024 was held at Aerial Sydney UTS Function Centre on 3rd–6th December 2024

Conference on Food for all: Promoting Equity, Diversity and Inclusion in Nutrition

Symposium 2: Economics of food and nutrition security sustainability

Review Article

Cite this article: Vargas C, Backholer K, Bennett R, Maganti R, Lewis M, Marshall J, Sacks G, Alston L, Gupta A, Needham C, Huse O, Ng SW, and Zorbas C (2025). Working towards affordable healthy diets: a review on innovations in food price monitoring, policy and research in Australia and beyond. *Proceedings of the Nutrition Society*, page 1 of 12. doi: 10.1017/S0029665125101225

Received: 11 April 2025
Revised: 22 June 2025
Accepted: 4 July 2025

Keywords:
Food price; Food cost; Diet price; Diet monitoring; Food policy

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Working towards affordable healthy diets: a review on innovations in food price monitoring, policy and research in Australia and beyond

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Abstract

Healthy diets are unaffordable for billions of people worldwide, with food prices rising in high-, middle- and low-income nations in recent times. Despite widespread attention to this issue, recent actions taken to inform policy prioritisation and government responses to high food inflation have not been comprehensively synthesised. Our review summarises (i) innovative efforts to monitor national food and healthy diet price, ii) new policy responses adopted by governments to address food inflation and (iii) future research directions to inform new evidence. Evidence synthesis. Global. None. We describe how timely food and beverage pricing data can provide transparency in the food industry and identify key areas for intervention. However, government policies that improve food affordability are often short-lived and lack sustained commitment. Achieving meaningful impact will require long-term, cross-sectoral actions that are led by governments to support food security, healthy diets and resilient sustainable food systems. This will necessitate a better understanding of how the political economy enables (or hinders) policy implementation, including through coherent problem framing, mitigating conflicts of interest in policymaking, working together as coalitions and developing and utilising evidence on the food security and related impacts of food pricing and affordability policies. Diverse actors must be better equipped with robust data platforms and actionable policy solutions that improve the affordability of healthy and sustainable diets, including by lowering food prices and addressing the broader socio-political determinants of food insecurity.

Background

Healthy diets are unaffordable for billions of people

Food security, or access to adequate, healthy, culturally appropriate and affordable food, is acknowledged by the United Nations (UN) as a fundamental human right and serves as the cornerstone of Sustainable Development Goal 2 (SDG 2). Set in 2015, SDG 2 aims to eliminate hunger, ensure food security, promote sustainable agriculture and reduce all forms of malnutrition globally by 2030[1]. As we pass the mid-point of the SDGs, it is clear that we will not achieve SDG 2 by 2030. In 2023, one in eleven (733 million) people experienced hunger, and two in five (2·33 billion) people experienced moderate or severe food insecurity – figures that had not improved to levels prior to the onset of the COVID-19 pandemic[2]. At the same time, in 2019, an estimated 188 million disability-adjusted life years (DALYs) and 8 million deaths among adults were attributable to dietary risks and diet-related diseases[3]. Dietary risks describe consumption patterns that are low in fruits, vegetables, legumes, nuts, seeds and milk while being high in processed meats, red meat, added sugars, trans fatty acids, sodium and alcohol[3]. Dietary risks contribute to overweight and obesity, cardiovascular diseases, type 2 diabetes and some forms of cancer[4]. Obesity continues to increase globally, with the prevalence projected to reach 1·2 billion adults by 2030[2]. Links between food insecurity and obesity have also been found in the literature, especially among girls and women[5,6]. Multiple countries now exhibit a triple burden of malnutrition – the coexistence of undernutrition, overweight and obesity and micronutrient deficiencies[7].

Many global nutrition challenges have either persisted or been exacerbated in recent years, in part due to COVID-19, climate shocks and conflicts. These factors have impacted food supply chains and contributed to the inflation of global food prices, putting basic healthy foods out of reach for more and more people[2]. For example, the global food supply chain has experienced shocks due to workforce shortages during the COVID-19 pandemic, increasing food prices and limiting food availability[8]. Events in 2022 increased attention to the effects of geopolitical issues on food shortages, such as sunflower oil and fuel shortages due to conflict in Ukraine[9]. Internationally and in Australia, food supply issues have also been exacerbated by climate change, including severe weather events such as floods, droughts and bushfires, which damage crops and contribute to food commodity shortages[10].

In 2020, the UN's annual State of Food Security and Nutrition in the World report measured the cost and affordability of a healthy diet as a critical component of food security[11]. The 2022 report suggested that approximately 35 % (2·8 billion) people worldwide could not afford healthy diets – a reflection of high food prices and low incomes[2–7,12]. In 2023, the Australian Foodbank Hunger Report indicated that 77 % of households were experiencing food insecurity for the first time, also due to increased living expenses such as food prices and low incomes[13]. Nonetheless, the affordability of food and beverages has long been a concern for people living in low-income households, as they allocate a higher proportion of their income to food-related expenses[14,15]. Further longitudinal evidence amongst First Nations communities living on remote reserves in Canada between 2008 and 2018[16] indicated that high food costs were key barriers to accessing healthy and traditional foods[16]. In Australia, households on low incomes (< $AU30K), outside of major cities (regional, rural and remote areas) and with single parents, have been identified among the most at-risk of experiencing food insecurity and most vulnerable to food price shocks[13,16–18].

Monitoring recent food inflation

Globally, food price data are consistently collected but not always utilised effectively. Most countries have national statistics offices that typically collect monthly, biweekly and occasionally, weekly prices for 60 to 200 commonly purchased food and beverage items to monitor inflation over time[19]. These data are aggregated and reported within countries and to international agencies, often as a Consumer Price Index (CPI) for all foods and beverages. In Australia, the annual CPI peaked in late 2022 for foods and beverages at 9·4 % higher than the previous year[20] (now at approximately 3 %[21]) – the largest increase in the previous two decades.

However, the standard collection of national food and beverage price data seldom reflects price changes as they relate to healthy and less healthy food and beverage classification systems and people's incomes. In 2024, the Australian Bureau of Statistics released CPI data according to the Australian Dietary Guidelines food groups (which had not been updated since 2016), demonstrating differential inflation across healthy and discretionary (i.e. unhealthy) food and beverage categories[22]. For example, from 2021–2023, the average prices of milk increased by 10·4 % compared to a 3·6 % increase in the price of alcoholic beverages[22]. This type of disaggregated food inflation data can help evaluate the relative cost and affordability of healthy compared to less healthy dietary components, support implementation and monitoring of policy and should ideally be undertaken on a regular basis[19]. In Australia's case, the 2024 metrics were updated eight years after their initial development[22].

To provide more routine and comprehensive national estimates of the cost and affordability (incorporating income data) of healthy diets and address the limited data being collected across different settings and population sub-groups, researchers have developed valuable monitoring tools. In particular, the International Network for Food and Obesity/non-communicable Diseases, Research, Monitoring and Action Support (INFORMAS) pioneered various food price and affordability monitoring approaches, which have grown and evolved in the last few years[11,23]. These price monitoring approaches[24,25] now increasingly focus on measuring the cost of a whole diet, compared to earlier work monitoring single food and beverage items[24,25], in efforts to better represent shopping and consumption behaviours[23]. Such approaches have been used in the USA, Canada, New Zealand and other high-income countries[26]. In Australia, the current optimal INFORMAS approach, the Healthy Diets Australian Standardised Affordability and Pricing (ASAP) protocol, has been used to test the reliability of using online data collection[27] and conduct diet cost and affordability audits across all states and territories[28], including in regional, rural and remote areas, in First Nations communities[29,30] and for low socioeconomic groups[25]. The Healthy Diets ASAP datasets were also used to show that healthy foods such as fruits and vegetables increased in price more than less healthy foods (e.g. processed meat, sugary drinks or prepared frozen meals) during the COVID-19 pandemic[31].

Government policy to address food prices and affordability

Reliable and routine reporting of food price and affordability indicators can stimulate proactive policy measures and evaluations to address rising food prices, the relative affordability of healthy and unhealthy diets and food insecurity[27,32]. In Australia, food and beverage price estimates, especially when reported using nutrition and equity lenses (e.g. understanding food prices for people on low incomes), have helped garner media attention and informed widespread food policy advocacy to address rising food prices in recent years[33]. Federal and State Governments in Australia have responded to public pressure to address rising food prices by conducting several inquiries into food insecurity and supermarket-led prices[34–37]. These inquiries have resulted in many recommendations, including more transparency and monitoring of food prices in real-time, providing support to local community stores and agriculture, developing a National Food Plan and amending legislation to address supermarket misuse of power in relation to food pricing.

During the COVID-19 pandemic, the Australian Government also temporarily increased basic income support payments to mitigate financial hardship and support people to meet basic needs such as food[38]. Beyond Australia, governments around the world have responded with various policy actions aimed at reducing the pressure of food inflation, food insecurity, social inequality and economic hardship experienced by populations. Policy areas of interest to governments worldwide have included direct financial assistance, food subsidies, increased provision of surplus food services, such as food banks and social supermarkets and market stability initiatives[39]. However, there has been limited synthesis of the types of policy responses that governments have taken to address rising food prices since the onset of the COVID-19 pandemic.

https://doi.org/10.1017/S0029665125101225 Published online by Cambridge University Press

The present review provides a comprehensive update and summary on innovations in food price and affordability monitoring, policy and research. This knowledge can help guide the prioritisation of future research and policy focused on identifying sound pathways to lower the price and improve the affordability of healthy and sustainable diets, especially relative to less healthy alternatives, and therefore strengthen progress towards SDG2: End hunger, food insecurity and malnutrition by 2030.

Streamlining food price monitoring systems

In this section, we review advancements in streamlined policy-relevant food price monitoring in Australia and internationally. These examples have been selected to demonstrate that opportunities exist for routine monitoring of the real (inflation-adjusted) price and affordability of healthy foods and healthy diets, co-designing integrated platforms that reflect different data sources and actor priorities, and tailoring data for specific population groups, especially people who are financially vulnerable.

Routine and real-time food price monitoring

Routine and real-time food price data have the potential to improve surveillance and intelligence to make decisions. These monitoring systems can enable decision-makers to better understand the inflation-adjusted prices and affordability of healthy foods as important factors in addressing food insecurity[40]. A crucial precondition for developing a comprehensive, routine and real-time food price monitoring system is the availability of necessary data[41].

Around the world, large food price datasets exist and are increasingly being made publicly available. In addition to national statistics offices, non-government organisations can support collection or reporting of data in resource-limited settings, aiming to inform policy responses to inflation. For example, the International Food Policy Research Institute (IFPRI)'s Food Price Monitor aims to pool daily, country-level wholesale and retail prices for staple food commodities in India, Guatemala and parts of Africa[42]. Examples also exist of not-for-profit groups streamlining food and beverage price collection using online data and web-scraping technologies. The Food Foundation, UK 'Food Prices Tracking'[43] provides an example of this potential by measuring weekly prices of a reasonably costed and adequately nutritious food basket for male and female adults. However, gaps still exist in collecting local data from other food markets, including small and informal retailers.

Community engagement approaches may be one way to strengthen the collection of localised food price and income data from any market, for example, via volunteers and community organisations. In Nigeria, 221 volunteers were engaged through the Food Price Crowdsourcing African platform to collect 21 827 prices in 2019[44]. A follow-up collection of 2134 prices by 65 volunteers occurred in 2020 to monitor food price changes during the COVID-19 pandemic[44]. Whilst this was found to be a feasible and valid approach[45], additional resources and infrastructure are needed to expand this work to include more citizens (including people experiencing various forms of social and/or economic marginalisation), broader geographic areas and increased regularity[46].

Importantly, for large food and beverage price datasets to be useful to policymakers and public health actors, price data must be conveyed across meaningful indicators of a healthy diet that are well-defined. For example, the prices of global healthy diet baskets that are reported by the FAO only include 11 foods, IFPRI reports price variations in 15 staple food commodities, The Food Foundation, UK tracks the cost of a nutritionally adequate diet made up of 69 food and beverages, and the Australian Bureau of Statistics has measured average annual inflation across seven dietary guidelines categories (unclear number of foods and beverage items)[22]. Measuring prices across healthy and less healthy food and beverage categories can signal to policymakers the need for more targeted interventions across the food supply chain. Moreover, measuring healthy diet prices at a household level has implications for broader social and economic policy, especially when integrated with income and poverty data to estimate how affordable a healthy diet is across populations, including for people on low incomes[14]. However, in most instances, a relatively small number of products inform food price calculations, which may indicate the importance of 'indicator' or 'reference' foods and beverages for policymaking[47,48].

Even when food price data are available, it is important that data are translated to the public and policymakers. In Australia, government inquiries into food prices and supermarket power have resulted in commitment and funding towards regularly collecting and reporting food price data with a view to provide the public and decision-makers with additional transparency into supermarket pricing practices[49]. Research has also previously described that developing a dashboard (i.e. a monitoring platform) can support public and policy-relevant data translation[41,50]. For a dashboard to have maximum utility, it is fundamental for data to be updated regularly (weekly or monthly based on our team's experience and to account for seasonality) to maintain an active and real-time dashboard. Indeed, the time dimension of food price monitoring is key for highlighting the urgency of political action during peak periods of inflation. Complementary data visualisation tools are also important for conveying analytical complexity via simple graphs or tables. Other international dashboards demonstrate the importance of data visualisation and disaggregation over time; for example, UN Women[51] have developed a series of dashboards to disaggregate annual estimates across SDG indicators by sex, including the global prevalence of food insecurity for women and men.

Refining estimates for priority populations

In streamlining the monitoring of food and healthy diet prices, there can be a risk of overlooking how different population groups experience food prices and their affordability. The disproportionate influence of food prices on the wellbeing of people with smaller or disproportionately impacted food budgets should be a key consideration when developing monitoring systems that can inform equitable food policies. The Food Foundation, UK's weekly price tracking of a grocery basket for men and women (using data from one retailer) highlights differential costs – with a man's nutritionally adequate diet costing more than a woman's[43]. Such data could be updated to further reflect gendered differences in income and, consequently, food affordability. For instance, the World Bank's metrics incorporate national poverty lines and the $2·15/day extreme poverty line to determine affordability thresholds for healthy diets (i.e. 52 % of household income)[52].

The Healthy Diets ASAP body of evidence in Australia also demonstrates how the price and affordability of healthy diets can be estimated for different priority populations, including six reference household types such as single-parent families, older

https://doi.org/10.1017/S0029665125101225 Published online by Cambridge University Press

adults, older single women[15], Aboriginal and Torres Strait Islander households[53] and regional, rural and remote communities[54]. When assessing the affordability of healthy diets for households on low incomes, healthy diets cost approximately 30 % of their income and are deemed unaffordable[29,55]. This diet affordability threshold is lower than the World Bank threshold (52 %) as it reflects higher incomes in high- compared to low-income countries[56].

An ongoing challenge of the Healthy Diets ASAP protocols and other methodologies is identifying ways to streamline food price data collection and/or development of representative healthy diets among diverse communities, including for culturally diverse communities[24,32]. Estimates of food prices and affordability are ultimately constrained by the lack of accessible or representative data on food expenditures, consumption, pricing, income, travel and time costs for various household compositions. To refine healthy diet options and food price datasets for different priority populations, resources should be mobilised from government, non-governmental and research organisations to enhance collection of this data.

Integrating diverse food price data sources

No one sector is primarily responsible for addressing food inflation and food insecurity. Relevant datasets exist across government, commercial, academic and not-for-profit sectors to advance various objectives, which can result in a lack of coherent food price monitoring and policy actions. For instance, whilst commercial food price datasets exist, the cost of accessing and using these is prohibitive for public health researchers since they are primarily used by the food industry to advance commercial interests (i.e. profitability). Consequently, much of the collected metrics are tailored to a commercial rather than a public health use. Datasembly[54,57] is a commercial dataset that collects over two billion product prices daily from 150 000 stores across the USA. However, there is insufficient public knowledge regarding how this pricing data might be leveraged to inform decisions related to food affordability and food security. As such, an imperative exists for governments to support publicly accessible food price monitoring to the same extent, thereby ensuring that commercial interests in food price data do not outweigh efforts to advance public health objectives[49]. In the meantime, interdisciplinary research is crucial to develop innovative approaches to consistently track food prices and their determinants across various contexts.

One important innovation demonstrated by IFPRI's Food Price Monitor[42] is the inclusion of major determinants of international food commodity prices, including exchange rates, taxes and subsidies (e.g. agricultural sector subsidies), shipping and freight costs and food import vulnerability (i.e. how reliant a country is on food imports and therefore how vulnerable it is to supply disruptions). This information has been integrated from various sources, such as from the Chicago Mercantile Exchange (CME), Bloomberg, FAO Global Information and Early Warning System (GIEWS). Whilst additional efforts are needed to link these data points with public health nutrition outcomes, several exemplar datasets that we reviewed have endeavoured to integrate food price data with key determinants through collaborative efforts. For example, the World Bank's Food Prices for Nutrition DataHub[48] integrates income data from the World Bank's Poverty and Inequality Platform[43] and the Australian Bureau of Statistics integrated CPI data with the Australian Dietary Guidelines as a result of funding provided by the Department of Health and Aged Care[22]. The integration of income data is particularly critical as food inflation is less of a concern when wage growth is indexed to meet increased living expenses.

Governments, non-government organisations and researchers should continue to work together to improve monitoring of the underlying drivers of food pricing and affordability, including income inequality, climate, conflict, supply-chain disruptions, trade influences (e.g. imported *v*. locally grown prices) and the price setting and profit-making practices of wholesalers, supermarkets and major food companies. Such data could further help all actors identify key policy areas to reduce food price shocks, improve healthy food supply resiliency and ensure healthy diets remain or become affordable for everyone.

Assessing policy responses to rising food prices in recent years

In recent years, countries have responded to rising food prices with diverse policies that are often tailored to address the severity of the inflation and its impact on priority populations. This highlights the need for comprehensive and context-specific policy approaches. Here, we review actions that governments have taken according to seven types of food pricing policies: price controls, government-led price surveillance, food relief and subsidies, income support payments, food industry development and supports, trade policies and 'other' cost of living relief measures (i.e. social and economic policies). Table 1 provides a summary of this information. Relevant information was obtained from media, government and non-government reports, including, where available, evidence (or lack thereof) of the impacts of policy measures. As a starting point, evidence of policy impacts was drawn from the Living Food Systems and Nutrition Evidence & Gap Map[70].

Types of policy responses

Price controls

Food and beverage price controls, including price caps and policies targeted at lowering prices, have been extensively discussed as a policy option in response to rising food prices. Countries implementing these price controls have included France (2022)[58], The Bahamas (2022)[74], Greece (2023)[75], Fiji (2021) and Kiribati (2021)[76], with the intention of stabilising the prices of a number of basic grocery items (usually targeting items like bread, milk, eggs, meat, etc.) and shielding consumers from further price spikes. In France and Greece, governments also threatened to impose financial penalties if food companies did not comply. More recently, the Australian Government (2025) has proposed to cap the prices for 30 essential products, including food, beverages, toiletries and baby items, to support First Nations and remote communities by matching the prices to items in major cities[63,77]

While we only include price controls implemented during recent food price crises, they have been previously implemented by governments, including in Malaysia (2011), Thailand (1999) and the Solomon Islands (1996), to prevent commercial entities from profiteering at the expense of people's access to basic foods and beverages[76]. However, price controls are often placed on less healthy options such as sugar, salt, sugar-sweetened beverages, instant noodles and processed meats[76], and there is little evidence of their long-term food security and health impacts across populations[78]. Moreover, the supply of price-controlled products can be impacted, and food industries can respond by introducing new higher-priced products to bypass regulation[78]. Ultimately,

https://doi.org/10.1017/S0029665125101225 Published online by Cambridge University Press

Table 1. Exemplars of national government responses to rising food prices since the onset of the COVID-19 pandemic and their potential impacts

Type of policies to address food prices	Description (and rationale)	Examples	Evidence of impacts
Price controls	Food price caps to offer consumers some temporary respite.	France (2023): Introduced a cap on the prices of numerous food items at major food retailers, including commitment from 75 food companies[58]. Mexico (2022): Six-month suspension of import tariffs on 21 staple items and five basic commodities for food processing[59].	Concerns about long-term viability, possible unanticipated effects on market dynamics, poor implementation by industry, unclear evidence of ongoing implementation.
Price transparency and monitoring	Transparency procedures were implemented by governments to prevent ongoing inflation and increase customer awareness of price changes.	UK (2020): Implemented food price transparency measures through the Competition and Markets Authority, including investigating the reasons for food inflation, encourage grocery retailers to make food price data publicly available, and emergency legislation for governments to act on price gouging in the short term[60].	Corrective action might be taken due to monitoring initiatives, which can be combined with revising legislation and codes of conduct to strengthen government-led industry regulation[61].
Emergency food relief and subsidies	Expansion or implementation of food relief programmes and emergency food aid to provide help to groups that are considered most vulnerable.	USA (2021): Increased the value of food benefits provided by the Supplemental Nutrition Assistance Program (SNAP) by 21 %[62]. Poland (2022): Removed the VAT on essential foods and beverages for two years[63]. Australia (2020): Increased government funding ($AU 200M) to emergency food relief and community food hubs, namely via food banks[64].	Aim to provide relief to people on low-incomes in the face of serious experiences of food insecurity – including due to rising grocery prices. Evidence suggests the additional benefits have helped cover some costs but no significant changes in food insecurity, diet quality or mental health outcomes were observed.
Income support payments	Households experiencing financial difficulty, including due to rising food costs, may be eligible for direct income support payments.	Brazil (2021): Between 2021–23, due to the economic crisis and food inflation reaching 37·5 %, the government introduced the *Auxílio Brasil* program. This increased the value of cash transfers families facing poverty to better access basic necessities such as food[65]. Australia (2020): Increased income support payments via additional COVID-19 supplement payment[29].	These targeted policies provide income support to low-income communities[66]. Whilst the Bolsa Família program[67] has previously been found to improve food insecurity and the *Auxílio Brasil* helped to alleviate poverty in Brazil, food insecurity remained high during the COVID-19 pandemic likely due to other factors such as food inflation. In Australia, people reported being more able to afford healthy food with the increased income support payments[68].
Food industry development and supports	Government initiatives to support local food production and agriculture by providing incentives, subsidies, and workforce development supports.	Philippines (2020): Increased investment in agricultural inputs (e.g. fertiliser subsidies) to promote food production, accessibility and affordability[69].	These programmes attempt to increase food supply chain stability over time, decrease dependency on imports, and improve food production within a country[70]. The evidence on the effectiveness of these programmes is mixed[70].
Trade policies	To ensure the supply of low-cost food for all, trade policy modifications can be carried out, such as restricting exports to main domestic reserves.	G7 countries (2020): Member States agreed to ensuring open and fair trading of food commodities in times of crisis by not restricting exports or stockpiling domestic supplies. Nonetheless, multiple countries implemented trade export restrictions at the beginning of the COVID-19 pandemic in 2020[71].	These measures are thought to assist in mitigating food price spikes, preventing food shortages, and stabilising food supplies within nations. The World Trade Organization warns that these actions risk longer-term trade inefficiencies and price instabilities[71].
'Other' cost of living relief measures/ social and economic approaches	Other policies to reduce the rising cost of living, such as fuel or energy subsidies, as well as social programmes designed to reduce financial stress, and therefore increase the amount of money available for food.	Spain and Belgium (2021–2022): Reduced the VAT on energy bills and provided vouchers for eligible households[72,73].	Reduced financial costs may lead increase money available for food, especially among households facing the most socioeconomic disadvantage. Empirical evidence on food-related outcomes is lacking.

https://doi.org/10.1017/S0029665125101225 Published online by Cambridge University Press

key challenges posed by these types of food pricing policies are that they do not address underlying factors such as supply chain disruptions, transport and higher production costs or fluctuations in global food prices.

Government-led price surveillance

Following the onset of the COVID-19 pandemic, there have been multiple government-led actions to improve food price transparency and monitoring. Multiple countries, such as the UK[60], Bulgaria[79], Australia[49] and India[80], have introduced new or strengthened existing food price monitoring mechanisms. In high-income settings such as the UK and Australia, governments funded public investigations into food inflation to evaluate reasons for price spikes and pricing practices. These actions were accompanied by policy proposals to increase government regulatory powers with the goal of providing better oversight of food prices and supply chains, preventing unfair pricing manipulations by businesses and informing and protecting consumers[60,81]. Ministers in Bulgaria cited similar reasoning for developing Bulgaria's Food Price tracking website, which aims to provide pricing transparency across the food system[79]. The Indian Government's actions to monitor the daily prices of 38 food commodities suggest that additional reasons for government-led periodic reporting of food prices include informing corrective policy actions and achieving market stability so that food is affordable[80].

Food relief and subsidies

As food prices, financial hardship and consequently food insecurity increased across nations, some governments strengthened various emergency food relief and food subsidy initiatives. In 2020, the Australian Government increased funding to existing food relief services, notably through food banks, to increase their capacities[64]. In the UK, whilst also supporting food banks, governments also increased funding to social supermarkets that offer food at discounted prices and are emerging as a more dignified alternative to food banks[82]. This is due to the potential for social supermarkets to offer customers more food choices, improve dietary diversity and reduce experiences of stigma[82]. At the same time, in 2020, the Indian government increased investment in the Public Distribution System (which normally provides populations facing financial disadvantage with subsidised food grains via Fair Price Shops) to provide an additional 5 kg of free wheat and rice per person per month[83]. An additional subsidy-like measure that governments took to reduce food prices since the COVID-19 pandemic included removing the Value Added Tax (VAT) on essential foods and beverages, as exemplified by the Polish government (2022–2024)[63].

In 2021, the US Biden government increased the amount of food benefits available to low-income families via the Supplemental Nutrition Assistance Program (SNAP) by 21 % – the first meaningful increase since 1975[84]. Rising food prices were cited as a major factor driving the revision of the programme[84], responding to evidence showing that the benefits were too low for low-income households to access a healthy diet[85]. Two studies have assessed the short-term impacts of these SNAP benefit increases on food security, diet quality and overall adequacy to support a healthy diet[86,87]. While the benefits were helpful in offsetting some household costs, rising food prices and the need for additional food preparation time likely limited the effectiveness of SNAP increases (with no significant effects on food insecurity, diet quality or mental health outcomes), suggesting that further increases and supports may be needed to improve food security and diet quality[86,87]. However, the foreseeable impacts of SNAP are likely to be limited by the budget cuts imposed by the new US Government[88].

Income support payments

The *Bolsa Família* programme was implemented in 2003 by the Brazilian Government as its flagship monthly cash transfer programme (~$USD 48 to eligible low-income households), aimed at reducing poverty and food insecurity[89]. In 2020, in response to the COVID-19 pandemic, the government increased the value of cash transfers to eligible individuals or households by implementing *Auxílio Emergencial* (Emergency Aid; ~$USD 110 base payment per household)[90]. Due to the escalating poverty and economic crisis, including food inflation reaching 37·5 % between 2021 and 2023, the government introduced the *Auxílio Brasil* programme (~$USD 114 base payment per household), which replaced the *Bolsa Família* programme. This constituted a further increase in the value of cash transfers to support households facing poverty and provided them with better access to basic necessities such as food[90]. Despite the programme increasing the incomes of 56 % of the population, 66 % of recipients still faced mild to severe food insecurity, with food inflation identified as a major driver[65]. Chile also introduced *Bolsillo Familiar Electrónico* ($USD ~15–18 per household per month) in 2023, a cash transfer programme aiming to directly help low-income households purchase food[91].

Food industry development and supports

During the onset of the COVID-19 pandemic, governments implemented additional measures to support food industry development through innovation and workforce development, predominantly aimed at improving local food production and agricultural sectors. In 2020, the Filipino Department of Agriculture invested 31 billion Pesos (~$USD 620 000) in the 'Plant, Plant, Plant Program' to increase agricultural inputs and outputs and enhance food production, accessibility and affordability[69]. Part 2 of the programme was launched in 2022, funded by an additional 24 billion Pesos (~$USD 442 600) to address intensified food inflation challenges from the Russia-Ukraine war[92]. Most of this investment included fertiliser subsidisation (20 billion Pesos), with another 1 billion pesos investment in urban and peri-urban agriculture, feed production, aquaculture and food distribution activities, respectively[92]. In a similar vein, the governments of Indonesia[93] and Singapore[94] invested in actions to reduce reliance on food imports by promoting local farming, research and development and national food security in response to rising food prices. For similar reasons, in 2022, the Canadian government temporarily accelerated and increased farmers' access to interest-free loans in response to the highest food inflation in a decade and the Russia-Ukraine war[95]. Many countries, including the Australian Government[96], have also increased their investment in Climate-Smart Agriculture, hoping to make food production more resilient, efficient and sustainable in the face of climate change[96]. Although not directly linked to food inflation, but rather to help reduce business costs during the broader economic downturn, UK food retailers were also eligible to receive financial assistance via rate reliefs from governments[97]. But this likely helped prevent food prices from increasing further.

The long-term impacts of many of these measures remain unclear. A survey (n 150) of the Filipino 'Plant, Plant, Plant' programme recipients in one municipality suggested that 80 % found the programme to be useful in improving food production for their families[98]. However, a study evaluating Indonesia's

https://doi.org/10.1017/S0029665125101225 Published online by Cambridge University Press

investment in local food production suggested that farmers' rice harvests decreased by 70 % because they had to allocate more time to growing government-funded vegetable crops (e.g. potatoes, garlic), which yielded lower profits than rice at markets[99]. In addition, farmers perceived that they were becoming suppliers to agribusinesses and at risk of losing their land due to formal requests for land titles[99].

Trade policies

Under convenings led by the Group of Seven countries (G7) and the World Trade Organization (WTO), Member States repeatedly made international trade agreements via formal Ministerial Declarations articulating their commitments to addressing recent food insecurity and food pricing crises[71,100]. These agreements focused on ensuring open and fair trading of food commodities in times of crisis by not restricting exports or stockpiling domestic supplies. Such actions are thought to promote collaboration in global food trade, ensure a steady supply of necessities to populations (including via food aid) and avoid food shortages worldwide[101]. These agreements were deemed necessary as more than 80 countries imposed trade export restrictions at the beginning of the COVID-19 pandemic in 2020[71]. The WTO cautioned that while export restrictions on food may ensure domestic supplies, the inequitable impacts of such policy measures on net-importing and lower-income countries should be considered, alongside domino effects whereby other countries may increasingly focus on local production, resulting in global trade inefficiencies and higher prices in the long-term[71]. If implemented, countries have agreed that food trade restrictions will be temporary and transparently reported via the WTO[71].

Other cost of living relief measures

Beyond more direct actions on food systems, some countries implemented social and economic policies across different fronts to alleviate financial hardship for families, often targeting people facing the most socioeconomic disadvantage. In theory, reducing other financial costs can lead to more financial freedom to purchase food[38], although there is a dearth of quantifiable evidence on this. In 2021–2022, governments in Spain[72] and Belgium[73] reduced the VAT on energy bills and provided energy vouchers for eligible households. Other measures to ease the cost of living in 2022 included a temporary 6-month reduction in the fuel excise in Australia[102] and energy subsidies (€2·1 billion) to fossil fuel plants to stabilise energy prices in Portugal and Spain[103].

Future research directions to achieve affordable healthy diets for all

Tracking the determinants of food inflation

A range of interrelated factors have contributed to sustained increases in global food prices since the onset of the COVID-19 pandemic, prompting concern from researchers, policy makers and the public. Initial disruptions to supply chains, including lockdown-related delays in food processing and delivery, rising freight costs and travel restrictions, were compounded by labour shortages, especially in the food manufacturing and agricultural sectors[104,105]. The inflation of food prices was also exacerbated by rising input costs, particularly natural gas and, consequently, fertilisers, which were further impacted by disrupted trade routes from major exporters such as Russia[106]. The Russia-Ukraine war intensified global food insecurity by driving up the price of key staple foods like wheat, maize and vegetable oils, given their role as exporters[107]. Concurrently, the growing frequency and severity of extreme weather events (drought, floods, hurricanes, etc.) have adversely affected agricultural productivity across the world[108].

Modelling studies have explored the complex drivers of food price volatility over time. A US time series analysis examined the impact of supply-side factors (including energy prices, supply chain pressure, transport prices, farm commodity prices, wages across the food production sector) and demand-side factors (money supply, disposable income per capita) on food prices between 2004–2022[109]. The study found that supply-side factors explained most of the observed food price changes across the period, but demand-side factors became increasingly important in recent years, likely due to government stimulus and income support during the COVID-19 pandemic[109]. Another analysis using FAO data concluded that between-country variation in food inflation was influenced by variability in economic and social stability, indicating that political factors should be included in future modelling frameworks[110]. Despite growing recognition of extreme environmental conditions on food supply shortages and, consequently, food price increases and food insecurity[111], they are still often overlooked in food insecurity models. For example, modelling that includes the impacts of extreme weather events on food production and distribution found that global hunger estimates would increase by up to 36 % by 2050, hypothetically depleting food reserves in many regions such as South Asia[112].

Another recent study comparing five-year food prices in Canadian mainstream retailers and local markets found that while input costs were similar across settings, inflation and profits were smaller for local markets compared to larger national or international chains[113]. This example highlights how rising food prices may be driven less by supply-side costs and more by market and commercial factors, particularly pricing strategies of large, transnational corporations. This phenomenon, often referred to as 'greedflation' has prompted government responses in several countries. In both Australia and the UK, concerns about excessive corporate profiteering during periods of food inflation have led to public scrutiny and regulatory proposals. In Australia, the Competition and Consumer Commission found that major supermarkets increased their profit margins even as food prices rose. In response, the Commission recommended stronger regulation of supermarket power through enhanced price transparency, improved supplier relationship and zoning reforms to foster market competition[35].

Robust data collection and dissemination are critical for identifying the determinants of food price fluctuations and shaping effective policy responses[106]. There is a need for a more consistent and comprehensive inclusion of different factors (agricultural, climate, corporate, market, social and political, etc.) in research models of food inflation and food affordability, including quantifying their impacts, to help governments comprehensively identify and prioritise actions.

Understanding the political economy of government responses to food inflation and affordability

Political and economic factors affect the implementation of food inflation and food security policy responses. For example, how food and nutrition problems are framed in public and policy arenas can ultimately shape how they are addressed[114]. Whilst evidence has previously shown that high-income countries frame food and nutrition policy issues as individual problems[115], recent public and policy framing of food inflation has been strongly tied to global economic and social crises (e.g. Brazil, Australia, US, Spain,

https://doi.org/10.1017/S0029665125101225 Published online by Cambridge University Press

Portugal, Greece, France) or a lack of adequate local food production (e.g. Singapore, Indonesia). These frames have prompted government urgency, responsibility and commitment to mitigate these challenges through more structural policy levers. The media has also facilitated extensive public debate and pressure on governments to act on these factors beyond individual control[116]. The degree of food inflation observed within a country may also influence the type of policy response, with countries such as Singapore focusing on longer-term food production measures, compared to Brazil (peak inflation of 37·5 % in 2022)[90], which revised its national cash transfer programme to immediately combat poverty. As Brazil's response also demonstrates, levels of social inequality within a country can influence the types of policies that governments prioritise to address food inflation, with many income support and food subsidy programmes targeting people experiencing socioeconomic hardship. Ideally, countries should try to address both immediate and long-term challenges.

Earlier evidence[116,117] examining the political economy of policy responses to the 2007–2008 food price crisis found that actions were influenced by power imbalances and conflicting interests between key stakeholders. This is no different to how governments, food and agricultural industries, media, non-government organisations and international organisations such as the G7 have influenced recent policy responses to food inflation. The extent of actors' influences on policy is thought to be moderated by whether governments include them in policy processes[116], which is of concern to food and nutrition policy more broadly due to growing multi-stakeholder governance potentially increasing the influence of private sectors[118]. Ongoing research attention is needed to provide examples of how to address the influence of commercial entities on global food security governance, including through regulating public-private partnerships, funding of initiatives and research, corporate concentration across the food system, lobbying, political donations and influence over trade agreements[119]. At the same time, pathways towards including more low- and middle-income countries in developing more equitable agricultural, trade and food security policies should continue to be explored and strengthened[120].

Moreover, in many countries, such as Australia and the US, there can be a lack of policy coherence between political election terms and an overall lack of coordinated intergovernmental action (horizontal and vertical coherence) on food insecurity, whereby responsibility varies across government departments (e.g. agriculture, family services, finance, etc.) at different levels[101]. Whilst some countries have established special food security task forces, which enable leaders from different sectors to work together, additional research is required to understand the overall effectiveness of these convenings. Stronger coherence across sectors and time horizons will be needed to ensure governments implement short and long-term policies to curb future food inflation. Understanding these political economy factors is especially important during 'crises', where policymaking can be expedited and heavily influenced by dominant actors[116].

Examining policy effectiveness

The Living Food Systems and Nutrition Evidence & Gap Map (the largest collection of high-quality research on food systems interventions in low- and middle-income countries) indicates there is strong evidence, mainly from high-quality systematic reviews in low- and middle-income countries, for the impacts of food subsidies and unconditional and conditional cash transfers, on dietary diversity, food insecurity and other nutrition outcomes such as weight and iron status[39]. Food voucher programmes have also been shown to improve dietary diversity[39], but with limited impacts on food insecurity among low-income households[121], whilst unconditional cash transfers have been found to reduce poverty[122]. Improving fertiliser access and contract farming can positively impact farmer and household incomes, crop production and food security in Asia and Africa[123–125]. Less evidence is available to support the impacts of temporary price caps and economic relief policies on food insecurity and nutrition outcomes. Given that multiple countries have implemented price caps and VAT reductions on foods and beverages since COVID-19, it would be important to understand the impacts of these measures on food insecurity to enable evidence-informed decision-making in the future.

Adequate income support schemes are also essential for governments to implement if they are committed to upholding people's rights to nutritious diets and food security. In recent years, this has predominantly taken the form of temporarily expanded unemployment benefits by nations such as the UK[126], Australia[127], Bermuda[128], Cyprus[129] and Canada[130]. Country-specific evidence of the impact of these changes on food affordability and food insecurity should continue to be developed to demonstrate policy (in)effectiveness.

Another policy recommendation in the UN's State of Food Security and Nutrition in the World report (2022) that requires additional investigation is the stipulation that countries should explore repurposing current agricultural subsidies (> $USD 900 billion annually), away from practices that promote poor human and planetary health and towards sustainable food production that benefits population health and equity[131]. We found some evidence of countries strengthening local and sustainable food production to deal with food price spikes. Prior to the COVID-19 pandemic, 90 % of food in Singapore was imported, with the government now aiming to increase local food production by 30 % by 2030[94]. Whilst the UN states that investing in sustainable local agriculture, workforce and food supply chains is important to build resilience against future food inflation, models are needed to demonstrate the long-term economic, health and sustainability benefits (including food price impacts).

Strengths and limitations

This review summarises current innovations in food price data, policy and research. This information is collectively important to provide policymakers with a suite of options to better address food price crises and mitigate global food insecurity. Our intention was to develop a high-level synthesis on this topic and not infer causality. Opportunities exist to apply systematic and scoping review methodologies across our focus areas, which would help develop more nuanced understandings of food price monitoring and data translation, ways to overcome political economy challenges and policy effectiveness.

Conclusions

Recent food inflation and cost of living crises have created critical, and in some cases unprecedented, policy windows for governments to improve transparency and regulation of food prices. Consistent, up-to-date and publicly available food and beverage pricing data, integrated with various determining factors, is essential for identifying effective policy levers across the food system. However, most government responses to rising food prices and

https://doi.org/10.1017/S0029665125101225 Published online by Cambridge University Press

their affordability are often temporary. There is a need for longer-term, national strategic thinking that strengthens food security, supports healthy diets and promotes sustainable food systems worldwide. Achieving this will require navigating political economy barriers and improving the evidence on which policy measures are most effective in improving population food security, nutrition and wellbeing, especially in the wake of the COVID-19 pandemic. Bridging these gaps is critical for guiding future policy advocacy and preparing for inevitable future shocks to our food system.

Acknowledgments. N/A

Author contributions. CZ led the conceptualisation of this article. All co-authors contributed expert advice on the scope of this review. CV and CZ reviewed the literature and drafted the first version of the manuscript. All authors reviewed and provided critical input on the manuscript. All authors agreed to be named on the submitted manuscript. No person who would reasonably be considered an author has been excluded.

Financial support. Our food pricing research has been funded by an NHMRC Centre for Research Excellence (RE-FRESH) and a project grant from the Australian Research Council [DP210102791]. CZ and AG were supported by Deakin University and Victorian Health Promotion Foundation (VicHealth) fellowships. KB was supported by a National Heart Foundation Future Leader Fellowship [106716]. GS was supported through a National Health and Medical Research Council Emerging Leadership Fellowship [2021/GNT2008535]. LA was supported by the Rural Health Multidisciplinary Training Program (RHMT) from the Australian Federal Government's Department of Health and Aged Care. CN was supported by the National Health and Medical Research Centre's – Medical Research Future Fund. The opinions, analysis and conclusions in this paper are those of the authors and should not be attributed to any of the funding bodies.

Competing interests. The author(s) declare none.

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https://doi.org/10.1017/S0029665125101225 Published online by Cambridge University Press