



# TRADE POLICY TECHNICAL NOTES

## TRADE AND FOOD SECURITY

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### The influence of agricultural, trade and food policies on diets\*



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#### WHAT ARE THE ISSUES?

There is now widespread recognition that those consuming more diverse diets are less likely to be deficient in the range of nutrients that are essential for optimal human functioning (Arimond and Ruel, 2004). Dietary diversity and quality have been shown to be important to improving nutrition outcomes ranging from anthropometrics to iron deficiency anaemia (Rah *et al.* (2010); Balarajan *et al.*, 2011). A nutritious diet is one that would not only provide adequate, though not excessive, energy (calories) necessary for functioning, but (a) would limit the intake of fats, salt and sugar, and (b) would also draw on a diverse range of foods - in particular vegetables, fruits and animal source foods - to ensure the provision of micronutrients such as iron and vitamin-A.

Traditionally, agricultural, trade and food policies have rarely been shaped by their anticipated dietary and nutritional impacts. Yet, such policy choices have potentially important consequences for the diets and nutrition of populations. For example, agricultural R&D expenditures, provision of irrigation infrastructure and agricultural support services are often designed primarily around a small set of staples. These may contribute to food security and provision of energy, but have the potential to encourage staple-heavy diets that lack diversity. To take a trade example, trade liberalization policies generally have the potential to alter the range of foods available in a country, and thereby can have either a positive or negative effect on dietary quality and diversity. In this note, we present an overview of dietary implications of such agri-food policies not explicitly targeted at nutrition.

#### CONCEPTUAL LINKAGES BETWEEN POLICY AND DIETS

We classify policies into the following groupings:

**Agricultural policies:** this includes domestic policies relating to inputs, agricultural production and processing/transport. Examples include agricultural R&D and technology policies, market price support, input subsidies, rural infrastructure policies, etc.

**Trade policies:** Examples include tariffs, nontariff barriers and export bans during food price surges. Agricultural trade policy in the last few decades has mostly concerned liberalization to bring individual countries into line with rules relating to the WTO and regional trade agreements.

**Consumer/Food policies:** this includes policies applying directly at the level of food acquisition/purchase and consumption that are not primarily motivated by nutrition/health reasons (i.e we do not cover 'healthy eating' policies). Examples includes food subsidies and vouchers.

Within each policy category, we restrict attention to particular policy areas that are especially relevant to dietary change and/or that have been most discussed in terms of their dietary relevance in the literature. We do not attempt to be comprehensive in examining policy-diet linkages. Also, our focus is on diets and the consumption of nutrition-relevant foods, and we do not consider outcomes such as obesity and diet-related diseases.

The figure below provides a simple conceptual framework of how these policies impact dietary quality and diversity. Each of these sets of policies has two predominant ways of influencing diets. Most such policy actions have an influence on incomes – national/sectoral incomes as well as their distribution across the population. Indeed, improved income is frequently amongst the primary policy objectives.

Higher incomes and improved socio-economic status influence food demand and are frequently associated with improved dietary diversity and quality, but may also prompt increased consumption of foods high in fats salt and sugar (Mayén *et al.*, 2014). The policies may also influence diets by changing the range, quantities and quality of food available across seasons and/or the relative prices of foods and/or consumer liking/preferences for specific foods.

Although both these broad pathways are typically important, most attention in policy debates tends to centre on the manner in which such policies change food availability, preferences or prices. However, it is important to also give due consideration to dietary change via the income pathway.

## DOMESTIC AGRICULTURAL POLICY AND DIETS

### Price support and reform in high income countries

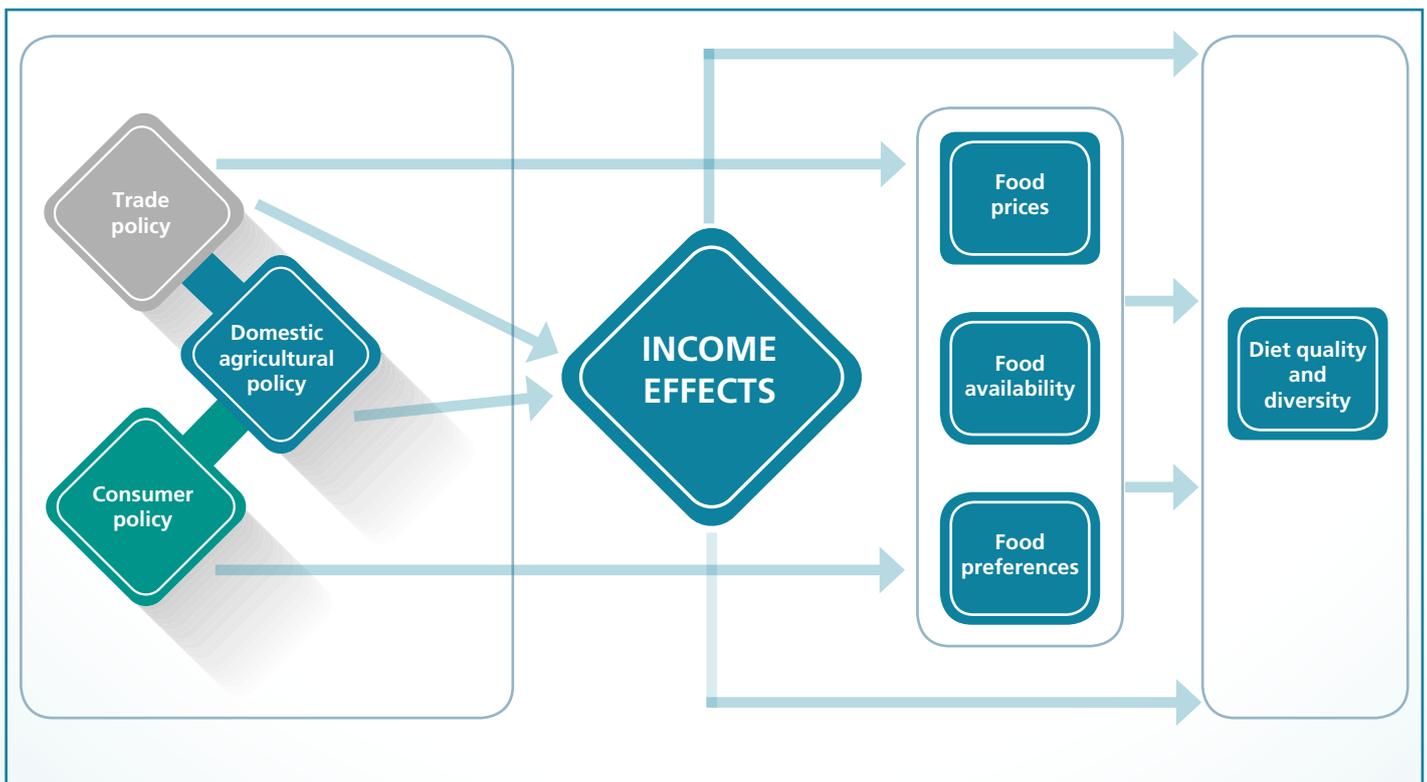
Support linked to the production of specific agricultural commodities has been a traditional plank of agricultural policy, particularly in many high-income countries (HIC). The EU’s Common Agricultural Policy (CAP) is a major case in point. Prior to reforms, the CAP combined price support to producers with tariffs to maintain artificially high domestic prices for specific commodities. Reforms carried out in the 1990s and 2000s have progressively delinked payments from production, bringing domestic prices in line with international prices.

Some public health scientists have argued in the past that traditional production-linked support to farmers in many high income countries encouraged overproduction and overconsumption of particular commodities, contributing to unhealthy diets. For example, highlighting EU support for the dairy industry, and in particular for the production of butter fat, Lloyd-Williams, *et al.* (2008)

hypothesized that without CAP subsidies, per-capita saturated fat consumption in the EU would be 1% lower, and estimated the associated health implications. However, the predominant form of past support in the EU was in the form of market price support, where a floor is set on prices received by agricultural producers for particular commodities. Schmidhuber (2007) notes this actually acted as an implicit tax on consumption, since prices paid by consumers were kept higher than international prices. What is more, given the long value chains of most food products in high income countries, farm prices are often only a small fraction of final prices paid by consumers. Hence encouragement of overconsumption and worsening of diets is unlikely to have been a major consequence of such past policy.

CAP reforms that move to equalize EU and world prices may therefore, by removing the implicit consumption tax, actually act to worsen diets and encourage overconsumption. However, the supply reductions arising from the policy change might also act to raise world and EU prices and act to discourage consumption. Whatever the impact on farmgate prices, weak price transmission is likely to blunt the effect on final consumers. This is highlighted by a study by Bonnet and Requillart (2011). In 2006, the EU instituted sugar reforms, and intervention prices for sugar were reduced substantially. Modelling the consumption impact of this policy change on soft drink consumption in France, Bonnet and Requillart (2011) estimate that the reform would raise soft drink intake by a modest 1 litre per person per year. For the US, Rickard *et al.* (2012) find that past distortions arising from commodity support had minimal impact on calorie intakes. The progressive removal of distortions and the declining role of commodity prices in determining consumer prices has further diminished links between support policy and diets and nutrition.

FIGURE 1. CONCEPTUAL FRAMEWORK OF HOW AGRICULTURAL, TRADE AND CONSUMER POLICIES INFLUENCE DIETS



Thus some of the public health literature may have overstated the link between past patterns of price support and healthiness of diets. It is natural to be concerned about potential nutrition impacts as reforms continue to equalize domestic and world prices. However, it is worth remembering that market efficiency is the priority of such reforms, and long-run income improvements associated with reform may contribute in the direction of improving diets. Low price transmission to final consumers along long value chains is likely to limit price-induced impact of reforms on dietary choices of consumers. That said, an unexplored area is how such commodity price policies may impact the ingredient choices of food manufacturers higher up the value chain where transmission of policy-induced price change is more significant (Hawkes, *et al.* 2012). As the importance of manufacturing industries as the primary consumer of agricultural commodities grows – and the consumption of highly processed food increases accordingly (Strem *et al.*, 2016; Mubarak *et al.*, 2012) – understanding how agricultural policies shape incentives for these actors and the whole value chain becomes critical (Hawkes *et al.* 2012).

### **Policies supporting staple cereals in Low and Middle Income Countries (LMICs)**

A fundamental characteristic of the recent history of agricultural policies in developing countries has been their focus on a narrow set of staple cereals, particularly wheat, maize and rice. This is particularly true of the Green Revolution in South Asia, where complementary policies in aspects such as market price support, fertilizer subsidies, irrigation provision, agricultural R&D and extension services have been oriented primarily towards supporting wheat and rice production. These policies have been instrumental in raising productivity of these staples, reducing poverty, improving food security and alleviating hunger.

As incomes have increased, the demand for more diverse diets has increased in these countries. However, as Pingali (2015) notes, the agricultural policies have largely remained cereal staple-focused and ill-equipped to promoting diversified production to meet demand. The supply response of vegetables, fruits and legumes has remained low, partly due to a policy environment skewed towards staples. Bangladesh is a case in point. Headey and Hodinott (2016) find that policy-driven rice yield growth in Bangladesh is not associated with improved dietary diversity in Bangladesh, even if it has contributed to earlier complimentary feeding (introduction of foods beyond the stage of exclusive breast-feeding) of children. Flood control and irrigation schemes geared for rice production in Bangladesh have been found to negatively impact floodplain fisheries upon which the poorest depend disproportionately for their nutrition (Shankar, *et al.*, 2004). Hossain *et al.* (2005) report that small scale irrigation projects in Bangladesh boosted rice but inhibited the production and consumption of oilseeds and pulses.

In parts of the world where staple-focused policies have already made substantial progress towards food security and poverty reduction objectives, a strategic shift towards a more 'crop-neutral' agricultural policy regime is desirable (Pingali, 2015). Such policies would encourage production diversification, allowing producers to respond effectively to increased demand for vegetables, fruit, legumes, etc. They may include aspects such as provision of market information services, credit, market infrastructure, etc.

### **Infrastructure investments**

Although not typically discussed as agricultural policy given their broader objectives, public investments in infrastructure potentially hold important implications for dietary quality and diversity. This includes investments in market facilities, roads, telecommunications networks and electrification. Some of the most micronutrient dense and nutritionally important foods, including fruits, vegetables and animal source foods, are also the most perishable. Improved infrastructure helps limit spoilage and distribute nutritious food across the population and improves incentives for diversified agricultural production. Stifel and Minten (2017) find that households in remote areas of Ethiopia have worse diets than those in less remote areas. Only a part of this is explained by differences in agricultural production – they find that higher transaction costs lead to worse terms of trade and lower engagement with markets in remote areas, restricting consumption and dietary diversity.

### **TRADE POLICY AND DIETS**

The major trade-policy related developments in the past few decades have involved deregulation and opening up of domestic markets to international competition. The 1994 Uruguay Round Agreement on Agriculture (URAA) ushered in bound tariffs, tariff reduction formulas and commitments to reduce export subsidies and domestic support. The setting up of the World Trade Organization (WTO) in 1995 facilitated further progress on these fronts, and also lowered non-tariff barriers (NTBs) with the Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) agreements. In response to the slow pace of change brokered by the WTO, a large number of regional Preferential Trade Agreements (PTA) have also been signed, providing further impetus for liberalization.

This set of trade liberalization policies has the potential to impact diets via each of the pathways depicted in the figure above. The major rationale for trade liberalization is of course the economic benefit arising from realisation of comparative advantage. Freer trade spurs economic growth, and improved incomes have a potentially strong influence on diets. Removal of tariffs and complementary domestic support policies affects the relative price of food compared to non-food commodities, as well as the prices of individual foods relative to each other. This influences consumption and diets. Opening up of markets also changes diets by altering the range of foods available to local consumers. Over the long run, liberalized trade can also change consumer preferences by increasing exposure to globally traded foods and the marketing associated with them. Disposal of surplus subsidised food from high income countries via trade can spur cheap imports into LMICs, changing preferences towards the subsidised import over the long run.

Changes to food availability arising from trade liberalization is the pathway that is by far the most written about. Much of this public health literature focuses on the expansion in availability of unhealthy foods arising from trade liberalization. The first key mechanism is the change in availability via increased food imports brought about by lowering of tariff and non-tariff barriers. Several cases have been described. For example, Hawkes (2006) discusses how liberalization in India in the 1990s resulted in a surge in imports of palm and soybean oils, displacing traditional oils such as peanut and rapeseed oil. This has implications for the healthiness of diets not only because of the expansion of edible oil overall in the diet, but also because palm oil in particular has higher saturated fat

content that most local competitors that it displaces (Shankar and Hawkes, 2013).

Also important is the impetus provided by liberalization policies for Foreign Direct Investment (FDI) in the food industry. Ultra-processed foods (UPFs) such as confectionery, potato chips and soft-drinks, typically high in fats, salt and sugar, are particularly prone to FDI-driven increases in availability. Since UPFs are typically less location-specific than minimally processed products, they are well suited to FDI involving technology and capital transfer (Reghmi and Gallagher, 2005). Also, tariffs on processed foods are on average higher than for primary products as countries seek domestic value addition, which further encourages FDI in highly processed foods (Diaz-Bonilla and Reza, 2000). Schram *et al.* (2015) set up a natural experiment design to test whether Vietnam's removal of FDI restrictions following accession to the WTO in 2007 influenced the sales of sugary soft drinks compared to the control case of the Philippines. They confirm a significant increase in sugar-sweetened beverage sales in Vietnam following liberalization, primarily led by foreign-owned firms. Food multinationals also use sophisticated marketing strategies that can shape long-run preferences for foods (Traill, *et al.* 2014). Liberalization-induced FDI may have a further ripple effect on local diets with the emergence of local competitors who imitate the strategies of multinationals.

Although WTO rules on non-tariff barriers are designed to discourage unnecessary technical barriers to trade, they do provide for technical regulation in the defence of public health or safety. However, some authors (eg. Baker, *et al.* 2014) have argued that food multinationals and other vested interests in the global food industry are typically able to mobilise significant opposition to the use of such standards, making their adoption difficult. Baker *et al.* (2014) also argue that the very threat of a complex WTO dispute can act as a 'regulatory chill', citing the example of Thailand's abandonment of a proposal to initiate a traffic light labelling system due to worries about a potential WTO dispute.

Some authors view the proliferation of regional PTAs as posing a further problem for healthiness of diets. This is because such PTAs typically go beyond WTO levels of deregulation (indeed that is the rationale for their existence), and may further dilute protections on grounds of public health. Some PTAs include investor-state dispute settlement mechanisms that allow corporations to directly take legal action against governments regarding regulations that run counter to PTA rules (Baker, *et al.*, 2014). These mechanisms further reduce the 'policy space' available to promote healthy diets. Stuckler *et al.* (2012) show that a PTA with the United States is associated with a significant increase in soft-drink consumption. Analysing the specific case of the Peru-US PTA, Baker *et al.* (2016) use a natural experiment design comparing Peruvian soft drink consumption change to the control case of Bolivia, which has no FTA with the US. They find mixed results – FDI has increased, but carbonated drink consumption has stagnated in Peru, while sports drinks and juice consumption has increased since the FTA, in comparison to Bolivia.

There has been little systematic and rigorous investigation of how trade reform induced relative price change has influenced diets. The global impacts of URAA-induced reforms have been estimated using global macroeconomic (computable general equilibrium) models, focusing largely on economic welfare and farm income

implications in their reporting (Traill, *et al.* 2014). These models estimate modest international price increases for agricultural commodities induced by reforms, largely due to reduction in overproduction following removal of domestic support. Given low transmission of international to domestic prices, trade liberalisation is likely to have had only small broad-based impacts on local food prices and diets (Traill, *et al.* 2014). That said, liberalisation policies can indeed have strong impacts on prices and consumption of individual foods in specific circumstances, as suggested by the above discussion on food availability. Food availability and prices are related (non-availability can be viewed as a very high implicit price, and increased availability reflects a reduction in price). Thus the case studies discussed above that investigate the change in the availability of particular foods following trade reforms also reflect the impacts of relative price changes.

When considering diets as a whole, the income pathway is probably the most important link between trade liberalization and diets, and yet tends to be little discussed explicitly. However, there is substantial research examining the individual components of the link, i.e. the impacts of trade reform on incomes, and the impact of income growth on diets. Anderson (2010) and Anderson *et al.* (2011) review global modelling evidence to report that agricultural trade-related policy reform has added around 1% and 0.7% to GDPs of LMICs and HICs respectively. Value added in agriculture in LMICs has increased by almost 5% as a result of such policy reform. Income growth in turn is widely recognised as an important driver of diets. Income elasticities for food are much higher in LMICs compared to HICs, and higher for animal-source foods and processed foods than for cereals (Traill, *et al.*, 2014). Thus trade policy reforms have likely played an important role in improving dietary diversity via income growth in LMICs, particularly with respect to animal-source foods, supplying important micronutrients to undernourished populations. At the same time, they may promote processed food consumption and lay the foundation for over nutrition problems.

Although basic trade models show that more liberal trade results in higher consumption outcomes (implying improved nutrition for the poor in developing countries), Atkin (2013) shows that this may emerge only in the long-run. Atkin argues that consumption is dictated by habit-formation. Under autarky, consumers develop liking for food that is consistent with their endowments, eg. preference for rice in rice-growing environments. Trade liberalization equalizes prices across regions, leading to these preferred local foods becoming more expensive locally for net exporting countries. Poorer consumers typically spend a large proportion of their incomes on these preferred local foods and are reluctant to substitute into imported food. Thus the potential consumption and nutritional gains from trade liberalization may not be fully realised in the short run. In the longer run, preferences adapt to the new availability and full gains from trade are realised.

## CONSUMER POLICY AND DIETS

Many countries, including high as well as middle/low income nations, provide food assistance of some kind to vulnerable consumers. These consumer-facing policies can be differentiated from 'healthy eating' policies since their primary goal tends to be food security or hunger prevention rather than dietary quality or variety.

## Food Assistance Programmes in HICs

Food Assistance programmes have a long history in many HICs, and have grown in importance whilst becoming better targeted. The US has been at the forefront, with its flagship programme, the Supplemental Nutrition Assistance Program (SNAP) (formerly the Food Stamp Program) reaching approximately 46 million Americans in 2014. SNAP provides 'coupons' (special debit cards) to eligible low-income Americans that can be used to purchase food at a variety of retail outlets. SNAP has been shown to have reduced hunger and food insecurity amongst participants (Yen, *et al.*, 2008). However, SNAP places relatively few constraints on eligible food purchases and its impact on diet quality and nutrition has been more difficult to establish, particularly given challenges in avoiding selection bias in estimating program impacts. Systematically reviewing the evidence, Andreyeva *et al.* (2015) conclude that, although SNAP helps participants obtain adequate calories, their dietary quality is lower than amongst non-participants. A variety of pilot initiatives are ongoing to improve dietary quality outcomes of SNAP, including incentivising purchase of healthy foods such as fruit and vegetables via a subsidy. SNAP will need to be bolstered by such complementary policies to achieve better dietary outcomes.

The Women, Infants and Children (WIC) program in the US and the Healthy Start programme in the UK offer a contrast with the SNAP, offering vouchers restricted to the purchase of healthy foods such as fruit and vegetables and milk. WIC has been shown to be a successful nutrition intervention, with participating children showing higher intakes of iron and vitamins without increasing calorie intakes and exacerbating obesity (Traill, *et al.*, 2014). The Healthy Start programme in the UK offers vouchers for the purchase of fruit, vegetables and milk to low-income families with young children. A recent evaluation (Griffith, *et al.*, 2015) has shown that Healthy Start increased spending on fruit and vegetables by 15%, although the increase was mostly registered amongst households who otherwise spent less than the value of the voucher on fruit and vegetables (i.e. households who were already spending more than the value of the voucher did not raise their fruit and vegetable expenditure much, thus treating the voucher largely as a transfer).

## Food subsidies in LMICs

Subsidisation of staple foods is a common food policy in LMICs. The rationale for such policies is that poorer consumers spend large proportions of their incomes on staples, and therefore subsidising staples should help improve calorie intakes (prevent hunger). However, Jensen and Miller (2011) point out that staples in LMICs are frequently strongly inferior goods, i.e. their consumption declines when income increases. If non-nutritional attributes such as taste are highly valued, the net effect of the subsidy may be to reduce staple consumption and substitute towards less nutritious foods or even non-food items. Thus the policy may not improve nutrition or may even worsen it.

Jensen and Miller (2011) tested effects of a subsidy based on data from a field experiment that provided rice or wheat flour subsidy vouchers to samples of poor households in two provinces of China. The randomized study design provided an opportunity for clean identification of policy effects. In Hunan province, the rice subsidy resulted in households cutting down on rice, vegetable, pulse and oil consumption, while seafood consumption increased. Overall, calorie and vitamin intakes were negatively affected. In

Gansu province, there was no evidence to indicate that nutrition improved. Thus this study broadly suggests that staple subsidies may not improve the nutrition of the poor.

Of particular interest are the staple subsidies, subject to household quotas, provided by the Public Distribution System (PDS) of India, the largest food policy undertaking of its kind in the world. The PDS supplies more than 50 million tonnes of subsidised wheat and rice to half a billion people every year. Since 1997, the PDS had been targeting poor households in its subsidy provision. This targeted scheme has proved to be massively inefficient, marked by poor success at targeting and large diversions into the open market. Studies of impacts (Kochhar, 2005) from those years found very small influences of subsidy on caloric intake (in a situation where a significant proportion of the poor were undernourished).

In the mid to late 2000s, a handful of Indian states abandoned targeting and returned to more broad-based entitlement to rice subsidies, also increasing the level of subsidy and tightening up administrative efficiency in the process. Analysing the impacts of this 'new style' PDS, Kishore and Chakrabarti (2015) find that not only does the rice subsidy increase rice consumption, but also the consumption of other foods such as pulses and vegetables, improving dietary quality. They speculate that the larger subsidies might account for the significant impacts found under the new system compared to the old, and also assert the importance of good administration. Rahman (2015) compares districts with targeted PDS to those with a universal PDS and concludes that the shift to the universal scheme has improved nutritional intake and dietary quality. Thus the research set in China and the Indian experience taken together suggest that the impacts of staple food subsidies on diets can be quite context specific, and that levels of subsidy, coverage and administration can all have a bearing on dietary impacts.

## SUMMARY AND CONCLUSION

Agricultural, trade and consumer policies have the potential to impact diets and nutrition, even if they are not explicitly designed for such purpose. There are two broad pathways through which they influence diets: one acting through income and the other by changing food availability and/or relative food prices and/or preferences for food.

Amongst domestic agricultural policies, domestic price support to agricultural producers in high income countries has in the past been linked to overproduction and unhealthy diets. However, it has been shown that such past support provided a price floor and therefore actually acted to discourage consumption. In any case, price transmission to final consumers is often very low, and on balance such policies (and their reform) are unlikely to have had major impacts on local diets.

In LMICs, many agricultural policies, from irrigation provision to agricultural R&D allocation, have been designed to support a narrow set of staples. Incomes in many of these countries have grown, and demand for dietary diversity has increased. Yet, the agricultural policies have remained focused on those staples, sometimes to the detriment of the diversity of local diets. In these countries, there is a need to make agricultural policies more 'crop neutral' and 'nutrition sensitive', allowing producers to

diversify production in response to demand. Policies to improve broad-based infrastructure such as roads and telecommunication facilities are under-researched in terms of nutrition potential, but particularly important, given their ability to support market-based provision of dietary diversity.

Much of the action on the trade policy front in the last few decades has involved liberalization, lowering of tariffs and non-tariff barriers and bringing countries into line with the multilateral framework of GATT and WTO. A large literature has discussed case studies where liberalization policies have made less healthy foods more readily available, to the detriment of local diets. Ultra processed foods produced by multinationals have made particular inroads into many markets with the lowering of barriers, although trade also facilitates more widespread availability of healthy foods such as fruit and vegetables.

Liberalization policies have also altered relative prices of foods globally, but the magnitude of price change, low food demand elasticities and low transmission of international to local prices imply this pathway is unlikely to have induced broad-based dietary change. The primary objective of liberalization is to create conditions for economic growth, and thus the income pathway to dietary change is particularly important. There has been little explicit evaluation of how trade-reforms induced income change has changed diets. However, there is plentiful separate evidence on how trade liberalization has improved incomes and how income growth in turn improves diets amongst the undernourished (but creates conditions for overnutrition in the process).

Many countries have implemented consumer-oriented food assistance policies. In HICs, the evidence suggests that targeting healthy foods in voucher schemes (i.e. reshaping food security policies into healthy eating policies) can improve dietary quality. Otherwise, such schemes may alleviate hunger whilst not improving, or even worsening nutrition. In LMICs, staple food subsidies are popular. These do not necessarily improve diet quality. The impacts of such subsidies on diets can be quite context specific, and levels of subsidy, coverage and administration can all have a bearing on dietary impacts.

In closing, a few observations on the state of the evidence are in order. There is a great need to improve the evidence base in this area. There is a particular need for more quantitative evidence on policy impacts based on rigorous study designs – currently, a high proportion of the evidence is based on commentary or case studies, which are valuable but can only be regarded as exploratory. Although studies using rigorous empirical methods have started to emerge recently (eg. Baker, et. al 2016; Schram, et. al 2015), there is still a long way to go. Secondly, agricultural and trade policies are natural areas of inquiry for economists and agricultural researchers, but they have been late in engaging with these issues. A high proportion of the research originates from the public health arena. Consequently, the available evidence tends to be concentrated in certain areas (eg. trade policy worsening diets by impacting food availability), but is thin in other important areas (eg. trade policy-induced income growth influencing diets). Ideally, teams comprised of both public health as well as agriculture sector researchers, particularly economists, would take forward this important agenda.

## REFERENCES

- Anderson, K. (2010). Globalization's effects on world agricultural trade, 1960-2050. *Philosophical Transactions of the Royal Society B: Biological Sciences* 365, 3007-3021.
- Anderson, K., Cockburn, J., and Martin, W. (2011). Would freeing up world trade reduce poverty and inequality? The vexed role of agricultural distortions. *The World Economy* 34, 487-515.
- Andreyeva, T., Tripp, A.S. and Schwartz, M.B., 2015. Dietary quality of Americans by Supplemental Nutrition Assistance Program participation status: a systematic review. *American journal of preventive medicine*, 49(4), pp. 594-604.
- Arimond, M. and Ruel, M.T., 2004. Dietary diversity is associated with child nutritional status: evidence from 11 demographic and health surveys. *The Journal of nutrition*, 134(10), pp. 2579-2585.
- Atkin, D., 2013. Trade, tastes, and nutrition in India. *The American Economic Review*, 103(5), pp.1629-1663.
- Baker, P., Kay, A. and Walls, H., 2014. Trade and investment liberalization and Asia's noncommunicable disease epidemic: a synthesis of data and existing literature. *Globalization and health*, 10(1), p. 66.
- Baker, P., Friel, S., Schram, A., & Labonte, R. (2016). Trade and investment liberalization, food systems change and highly processed food consumption: a natural experiment contrasting the soft-drink markets of Peru and Bolivia. *Globalization and health*, 12(1), 24.
- Balarajan, Y., Ramakrishnan, U., Özaltin, E., Shankar, A.H. and Subramanian, S.V., 2012. Anaemia in low-income and middle-income countries. *The Lancet*, 378(9809), pp.2123-2135.
- Bonnet, C. and Requillart, V. (2011). Does the EU sugar policy reform increase added sugar consumption? An empirical evidence on the soft drink market. *Health Econ.* 20, 1012-1024.
- Diaz-Bonilla, E. and Reza, L. (2000). Trade and agroindustrialization in developing countries: trends and policy impacts. *Agricultural Economics* 23, 219-229.
- Griffith, R., von Hinke Kessler Scholder, S., & Smith, S. (2014). Getting a healthy start. Nudge versus economic incentives. Centre for Market and Public Organisation Working Paper, (14/328).
- Hawkes, C. (2006). Uneven dietary development: linking the policies and processes of globalization with the nutrition transition, obesity and diet-related chronic diseases. *Globalization and health* 2, 4.
- Hawkes, C., Friel, S., Lobstein, T. and Lang, T., 2012. Linking agricultural policies with obesity and noncommunicable diseases: a new perspective for a globalising world. *Food Policy*, 37(3), pp.343-353.

- Headey, D.D. and Hoddinott, J., 2016. Agriculture, nutrition and the green revolution in Bangladesh. *Agricultural Systems*, 149, pp.122-131.
- Hossain, M., Naher, F. and Shahabuddin, Q. (2005). Food security and nutrition in Bangladesh: Progress and determinants. *Electronic Journal of Agricultural and Development Economics*, 2 (2), pp. 103–132.
- Jensen, R.T. and Miller, N.H., 2011. Do consumer price subsidies really improve nutrition?. *Review of Economics and Statistics*, 93(4), pp.1205-1223.
- Kishore, A. and Chakrabarti, S., 2015. Is more inclusive more effective? The 'New Style' public distribution system in India. *Food Policy*, 55, pp.117-130.
- Kochar, A. (2005). Can targeted food programs improve nutrition? An empirical analysis of India's public distribution system. *Economic Development and Cultural Change* 54, 203-235.
- Lloyd-Williams, F., O'Flaherty, M., Mwatsama, M., Birt, C., Ireland, R., and Capewell, S. (2008). Estimating the cardiovascular mortality burden attributable to the European Common Agricultural Policy on dietary saturated fats. *Bulletin of the World Health Organization* 86, 535-541A.
- Mayén, A.L., Marques-Vidal, P., Paccaud, F., Bovet, P. and Stringhini, S., 2014. Socioeconomic determinants of dietary patterns in low-and middle-income countries: a systematic review. *The American journal of clinical nutrition*, pp.ajcn-089029.
- Pingali, P., 2015. Agricultural policy and nutrition outcomes—getting beyond the preoccupation with staple grains. *Food Security*, 7(3), pp. 583-591.
- Rah, J.H., Akhter, N., Semba, R.D., De Pee, S., Bloem, M.W., Campbell, A.A., Moench-Pfanner, R., Sun, K., Badham, J. and Kraemer, K., 2010. Low dietary diversity is a predictor of child stunting in rural Bangladesh. *European journal of clinical nutrition*, 64(12), pp.1393-1398.
- Rahman, A., 2016. Universal food security program and nutritional intake: Evidence from the hunger prone KBK districts in Odisha. *Food Policy*, 63, pp. 73-86.
- Regmi, A. and Gehlar, M. (2005). Factors shaping global food markets. *New Directions in Global Food Markets. Electronic Report from the Economic Research Service.* Washington DC: United States Department of Agriculture.
- Rickard, B.J., Okrent, A.M. and Alston, J.M., 2013. How have agricultural policies influenced caloric consumption in the United States?. *Health economics*, 22(3), pp.316-339.
- Schmidhuber, J. (2007). The EU diet - evolution, evaluation and impacts of the CAP.
- Schram, A., Labonte, R., Baker, P., Friel, S., Reeves, A., & Stuckler, D. (2015). The role of trade and investment liberalization in the sugar-sweetened carbonated beverages market: a natural experiment contrasting Vietnam and the Philippines. *Globalization and health*, 11(1), 41.
- Shankar, B., Halls, A. and Barr, J., 2004, May. Rice versus fish revisited: on the integrated management of floodplain resources in Bangladesh. *Natural Resources Forum (Vol. 28, No. 2, pp. 91-101).*
- Shankar, B. and Hawkes, C., 2013. India has a problem with palm oil. *British Medical Journal*, 347:f6065.
- Stifel, D. and Minten, B., 2017. Market Access, Well-being, and Nutrition: Evidence from Ethiopia. *World Development*, 90, pp. 229-241.
- Stuckler, D., McKee, M., Ebrahim, S. and Basu, S., 2012. Manufacturing epidemics: the role of global producers in increased consumption of unhealthy commodities including processed foods, alcohol, and tobacco. *PLoS Med*, 9(6), p.e1001235.
- Traill, W.B., Mazzocchi, M., Shankar, B. and Hallam, D., 2014. Importance of government policies and other influences in transforming global diets. *Nutrition reviews*, 72(9), pp.591-604.
- Yen ST, Andrews M, Chen Z, Eastwood DB. Food stamp program participation and food insecurity: an instrumental variables approach. *Am J Agric Econ*. 2008;90(1):117–132.