

LEVERAGING AGRICULTURE AND FOOD SYSTEMS FOR HEALTHIER DIETS AND NONCOMMUNICABLE DISEASE PREVENTION: THE NEED FOR POLICY COHERENCE

Prepared for FAO by

Corinna Hawkes^{1a} (c.hawkes@wcrf.org), Anne Marie Thow,² Shauna Downs,² Suparna Ghosh-Jerath,³ Wendy Snowdon,⁴ Emily Morgan,⁵ Ismail Thiam,⁶ Jo Jewell¹

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^a ¹ World Cancer Research Fund International; ² Menzies Centre for Health Policy, University of Sydney; ³ Indian Institute of Public Health, Public Health Foundation of India; ⁴ Pacific Research Centre for the Prevention of Obesity and Non-communicable Diseases; ⁴ London School of Hygiene and Tropical Medicine/Leverhulme Centre for Integrative Research into Agriculture and Health; ⁵ Gaston Berger University, Senegal.

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PAPER STATUS AND OBJECTIVE

This paper has been prepared as a contribution to FAO's Global Forum on Food Security and Nutrition online discussion on "Nutrition-enhancing agriculture and food systems" 1-22 July, 2013. It is a working draft (dated July 1, 2013) which will be completed following the comments received during the discussion. The paper focuses on nutrition and diet-related non-communicable diseases (NCD), as a key component of the global burden of malnutrition. It focuses on the need for coherence between agricultural and food system policies and policies that aim to promote healthy eating as a means of preventing and controlling NCDs. It aims to show there are opportunities to leverage agriculture and food systems for NCD prevention through policy. Since the leveraging of food systems for NCD prevention is still a nascent area, it also discusses the different methods for further research and analysis that are available to identify that specific points for policy intervention that can create more policy coherence between agriculture, food systems and healthier eating.

The paper first provides the background: the burden of NCDs and their link with diets. It then provides an overview of the types of policies that have been implemented to address the problem. The paper then **opens for discussion** two critical questions regarding policy coherence in this area. First, *what are the potential benefits from intervention and collaboration to leverage agriculture and food systems for healthier diets and noncommunicable disease prevention?* In this section, we aim to start a discussion of the relevance of agrifood systems to policies to promote healthy eating. Second, *how can the health sector effectively engage with the agri-food system?* In this section, we begin to address this question by outlining some of the analytical methods that can be used in this nascent area to identify policy coherence and incoherence. This is followed by a series of examples from health sector analysis of short and long agri-food chains, which shed light on the potential for intervention and collaboration between sectors to improve diets and prevent NCDs. We conclude the paper by drawing a series of recommendations for relevant actors.

BACKGROUND: DIET- AND NUTRITION- RELATED NONCOMMUNICABLE DISEASES

The context of this paper is the global burden of ill-health arising from poor quality diets associated with NCDs and their metabolic risk factors, notably high blood pressure and cholesterol and obesity. An unhealthy diet is one of the key risk factors for NCDs. For example, inadequate consumption of fruit and vegetables increases the risk for cardiovascular diseases and several cancers; high salt consumption is an important determinant of high blood pressure and cardiovascular risk and increases the risk of stomach cancer; high consumption of saturated fats and trans-fatty acids is linked to heart disease; a range of dietary factors have

been linked with diabetes; red and processed meat consumption is linked with some cancers (WHO, 2003; Steyn et al., 2004; WCRF, 2007; WHO, 2011). In addition, excessive energy intake leads to overweight and obesity, which is linked with a range of health problems, including NCDs (WHO, 2000). Diabetes has particularly strong associations with obesity (Steyn et al., 2004), and evidence shows associations between body fatness and some leading cancers (WCRF, 2007).

According to data from the WHO, 63% of deaths worldwide in 2008 were due to NCDs. NCDs are the most frequent cause of death in the Americas, the Eastern Mediterranean, Europe, South-East Asia, and the Western Pacific. Of the 36 million deaths associated with NCDs, 80% occurred in low- and middle-income countries. The prevalence of NCDs is rising rapidly in Africa, where NCD mortality is expected to exceed deaths from infectious diseases by 2030 (WHO, 2011). The Global Burden of Disease Study identified similar trends, placing deaths from NCDs at around 35 million in 2010, an increase in around 8 million annual deaths between 1990 and 2010 (Lim et al, 2012).

Common modifiable risk factors (namely tobacco, alcohol, unhealthy diet and physical activity) underlie most cases of NCDs (WHO, 2011). With regard to unhealthy diet as a risk factor, most estimates address specific elements of unhealthy diet separately. For example, WHO estimates that approximately 1.7 million deaths and 16 million DALYs are attributable to low fruit and vegetable consumption (WHO, 2011). In terms of metabolic risk factors associated with unhealthy diet, the WHO estimates that 2.8 million people die each year as a result of being overweight or obese (WHO, 2011). The prevalence of overweight is highest in upper-middle-income countries but very high levels are also reported from some lower-middle income countries in Europe, the Middle East and the Americas, and it is reported to be rising throughout low- and middle-income countries. The Global Burden of Disease Study found that dietary risk factors and physical activity collectively accounted for 10% of global DALYs in 2010, with one of the most important dietary risks being low fruit and vegetable consumption (Lim et al, 2012).

There are, moreover, important inequalities in exposure to risk factors for NCDs among different population groups, between and within countries. Low fruit and vegetable consumption, for example, shows regular inequality with consistently lower levels of consumption among disadvantaged groups (Hosseinpour, 2012).

POLICIES FOR PROMOTING HEALTHY DIETS AND PREVENTING NCDs

The multi-sectoral approach to promoting healthier diets

To address the health burden, there is consensus that multisectoral approaches are needed. At an international level, this was first established by the WHO's Global Strategy on Diet

Physical Activity and Health in 2004 (WHO, 2004). It was re-iterated by the UN High Level Meeting on NCDs, and strengthened by the WHO Global Action Plan for NCDs FOR 2013-2020, adopted in May 2013. The Action Plan includes multisectoral action as an overarching principle, stating that (WHO, 2013: 13):

It should be recognized that effective noncommunicable disease prevention and control require leadership, coordinated multistakeholder engagement and multisectoral action for health both at government level and at the level of a wide range of actors, with such engagement and action including, as appropriate, health-in-all-policies and whole-of-government approaches across sectors ...

Policy options

Policy is an essential component of this multisectoral approach. The WHO Global Action Plan for NCDs highlights key policy objectives for healthy diets and NCD prevention as: increasing healthy food consumption (such as fruit and vegetables), reducing salt/sodium intake, replacing saturated and trans fat consumption with unsaturated fats, limiting excess calorie intake, and reducing content of free sugars in foods and beverages. Government policy initiatives to date reflect these policy priorities, and generally have the objective of increasing or decreasing consumption of specific foods or nutrients, or promoting healthier diets in general.

However, policy action to promote healthy diets and prevent NCDs around the world remains inadequate; the WHO's 2010 NCD Country Capacity Survey found that 75% of countries reported having a policy, plan or strategy on unhealthy diets, but only 43% of countries had funded and implemented them (WHO, 2012). Increasing fruit and vegetable consumption is one of the most common objectives of healthy eating policies in low and middle income countries, with 31% of low and middle income countries reporting some form of policy with this objective (Lachat et al, 2013). Policies to promote fruit and vegetable consumption are more widespread in higher income countries. Fewer countries have policies aiming to reduce consumption of specific foods and nutrients. 17% of low and middle income countries report having policies to reduce dietary fat consumption, with the majority of strategies relating to total fat intake (rather than saturated fat or trans fatty acids) (Lachat et al, 2013). The WHO reports less than 25% of countries surveyed have introduced policies to reduce trans fatty acids in processed foods (WHO, 2013b), while Downs et al (2013) reports just 15 countries have policies designed to reduce trans fat consumption. On salt, it has been reported that 32 countries have strategies designed to reduce salt intake (Webster et al., 2011).

Governments typically put into place a range of different tools to achieve these objectives, which fall into three categories:

- Providing food and nutrition education, information and skills direct to consumers
- Improving the food market environment,
- “Upstream” actions in the food supply, including in agri-food systems.

Of the policies in place, WHO’s Global Nutrition Policy Review found that the largest proportion focus on education and information, with somewhat less targeting the food market environment. These policy approaches are ‘downstream’ or ‘consumer-facing’ policies, that seek to support and empower consumers to make healthful food choices. Very few “upstream” actions, such as those targeting agrifood systems, were reported (WHO 2013b). These findings are reinforced by other reviews of policy actions by governments around the world (e.g. Hawkes, 2013; Lachat, 2013). The WHO Global Action Plan for NCDs recommends policy action to support healthy diets in all of these categories.

Education, information and skills

Typical actions taken to educate and inform are public awareness campaigns, food-based dietary guidelines and nutrition labelling. Of the low and middle income countries with policies on fat intake, 65% proposed strategies targeting the general public and consumers through public awareness campaigns, with many centring their communications around dietary guidelines (Lachat, 2013). 43% of reporting countries had general healthy-eating campaigns promoted in the media. Twenty-eight of the 32 countries with salt reduction strategies report using public awareness as a core component of the strategy (Webster et al., 2011). National fruit and vegetable campaigns are a relatively widespread means of promoting greater fruits and vegetable consumption, and normally focus on the consumption of a given number of portions per day (e.g. “5 a day”). Such schemes exist in most world regions, including in sub-Saharan Africa, the Middle East, South America and Asia Pacific (Hawkes, 2013).

In terms of nutrition labelling, the WHO report that at least half of the countries in their global nutrition policy survey have labelling policies in place (WHO, 2013b). Low- and middle-income countries (e.g. Jamaica, Mauritius) are increasingly using labelling as a way of encouraging informed choice, including for nutrients of concern such as saturated fat (Lachat, 2013). The number of countries requiring mandatory nutrition labelling is increasing, as are countries which require trans fat labelling (Hawkes, 2010; Downs et al., 2013). More countries are also introducing interpretative elements in their labelling – that is, labels which use graphics to make the nutrient list more readily understandable by consumers – include the UK, which has recently agreed a voluntary national traffic light scheme, and Norway, Sweden and Denmark, which have established the ‘keyhole’ logo that identifies the healthiest options.

Improving food markets

Of policies that aim to change the food market environment, targeting schools is one of the more frequently used options. A number of countries have implemented food and nutrition-based standards for the food available in schools (Hawkes, 2013; Lachat, 2013). This takes the form of rules on school meals, restrictions on certain foods or drinks (e.g. 30 countries have taken some form of action to restrict sugar-sweetened beverages) or rules restricting certain channels of delivery (e.g. the ban on the use of vending machines in French educational facilities). Many countries, including low- and middle-income countries (e.g. Sri Lanka, Mongolia) also ensure the inclusion of fruit and vegetables in school meals (Lachat, 2013). The provision of fruit in schools is widespread in the European region but less widely implemented elsewhere (WHO, 2013b).

Economic tools are also available to change the food market environment. These include food taxes (on specific nutrients or energy-dense products), targeted subsidies and rules on the use of price promotions at point of sale and minimum unit pricing in retail. According to the OECD, the most novel aspect of policy development around obesity in OECD countries since the late 2000s has been the “strong and increasing interest in the use of fiscal measures to limit the consumption of foods high in fat, sugar and salt” (OECD, 2012:3). European countries that have introduced taxes include Denmark on saturated fat (repealed in 2012), Hungary with a ‘health product tax’ and France with soda tax. Moreover, WHO reports that there is interest in developing policies across most regions (WHO, 2013b). Several governments in low and middle income countries are exploring the possibility of introducing fiscal measures to modify the intake of specific nutrients (e.g. Bhutan and Mongolia are reported to consider fiscal policies targeting fat intake), specific foods (e.g. Cambodia exploring feasibility of subsidising vegetable oil) or energy dense foods more broadly (Lachat, 2013). Several Pacific Island countries have introduced excise taxes and import duties, typically on high-sugar products (Thow et al 2011). Some countries are considering fiscal measures aimed at reducing the price of healthy foods (e.g. Brazil), and other low- and middle-income countries report monitoring the food price index as a policy priority for fruit and vegetables (e.g. Cuba) (Lachat, 2013).

Another policy option is reducing food marketing by restricting food advertising and other forms of commercial promotion. At least 22 countries have developed explicit policies on marketing to children, over half of which are in the European region (Hawkes and Lobstein, 2011). However, there is interest and policy development worldwide – in particular the Western Pacific Region (WHO, 2013b). Several countries are in the process of developing statutory regulations, including Chile, Fiji and Peru (Hawkes, 2013). No policies are currently fully comprehensive, but they do impose restrictions. Some countries have identified marketing restrictions as a means to reduce fat intake (Lachat, 2013).

Upstream policies

To date, there has been relatively limited policy action to encourage “upstream” changes in the food supply. A number of countries have policies in place to promote the production, consumption and local marketing of fruit and vegetables, including via family agriculture. Many of these policies were originally designed in the context of food and nutrition insecurity to address micronutrient deficiencies but are now serving a dual purpose in the context of NCDs (Lachat, 2013). Another example of more upstream approaches to change the food supply is policies that encourage reformulation for salt, and bans or restrictions on the use of trans fats. Three Pacific Islands also attempted to alter their supply of fatty meat cuts by banning imports (Thow et al, 2010).

THE POTENTIAL BENEFITS FROM INTERVENTION AND COLLABORATION TO LEVERAGE AGRICULTURE AND FOOD SYSTEMS FOR HEALTHIER DIETS AND NONCOMMUNICABLE DISEASE PREVENTION

Policy coherence with agriculture and food systems

An agrifood system that is working effectively to promote healthy diets is one in which there is “policy coherence”. Policy coherence is the systematic promotion of mutually reinforcing policy actions across government departments and agencies creating synergies towards achieving the agreed objectives (OECD, 2003). Within national governments, policy coherence issues arise between different types of public policies, between different levels of government, between different stakeholders and at an international level. In agriculture, food systems and nutrition, the “coherence” of importance is between the food policies implemented to promote healthy eating, and agri-food policies designed to meet economic and food security objectives, such as policies on investment, price, trade, privatisation and marketing. Policy *incoherence* occurs when agrifood policies undermine the objectives of policies to promote healthier diets, and vice versa. Such “incoherence” emerges from differing objectives: policies for agriculture and food systems actors aim to meet economic and food security objectives, while nutrition policies aim to meet nutrition and health objectives.

This “*policy coherence*” approach extends beyond most earlier research which has attempted to identify links between agrifood system policies and dietary outcomes. Most of this existing research (of which there is very little) has focused on assessing the ways in which agrifood policies may have influenced dietary outcomes. For example, historical analyses show that trade policies can have positive effects on the food supply, such as the increase in supply of traditional root crops during periods of import substitution and agricultural investment, as well as negative effects through increasing availability of highly processed foods (Thow and Hawkes 2009; Thow, Heywood et al. 2011b). In contrast, the three-step coherence approach

proposed in this paper focuses on the ways in which agrifood policies *interface* with healthy diet *policies* and their effectiveness, feasibility and acceptability.

The underlying premise is that 1) agricultural and food system policies shape incentives for the production of (healthy) food, thus creating incentives for consumers, and that 2) interventions that influence the availability, affordability and acceptability of food for consumers also create incentives for producers and manufacturers. Policies to support healthy diets for NCD prevention (reviewed above) thus directly interface with agriculture and food systems through three main avenues:

1. Policies implemented to promote healthy diets have repercussions upstream for the actors and activities in the agriculture and food systems
2. Existing agrifood policies influence the effectiveness of policies to promote healthy eating (either by reinforcing them, or presenting barriers/undermining them)
3. Policy actions may be actually implemented with the explicit intention of leveraging agriculture and food systems to promote healthy diets (i.e. through their downstream implications for food education skills and the market environment).

Food supply and value chains

In all cases, agriculture and food systems are linked with policies to promote healthy diets through the food supply chain. A food supply chain is made up of actors and activities that influence the passage of a food product from farm to fork, including the inputs into the farm and outputs from the fork. Food supply chains represent a form of “food system” since all the actors and activities involved in the supply of a food product are linked, with a change in one part of the chain affecting the rest of the chain. Another way of conceptualising the food supply chain is as a food *value* chain, which implies that the description and analysis of the chain involves not just identifying the relevant activities and actors, but where and how much value is created and added by these activities and for these actors (a process termed “value chain analysis”) (Hawkes and Ruel, 2011).

Broadly speaking, there are two types of chain relevant to leveraging agrifood systems for healthier diets and NCD prevention: “short” and “long” chains. “Short” chains are present in many rural areas, Island communities, urban agriculture, farm-to-school programmes, and in any area where local markets are served by local farmers. They are able to transmit changes in production to consumers and can also have the cultural effect of “re-connecting” people with food and agriculture, for example, by supporting production and consumption of indigenous healthy foods (Kuhnlein, 2010). In contrast “long” chains have a less direct connection between producers and consumers. These chains tend to be longer – especially

they involve some form of cross-border globalisation – but their defining characteristic is that they are designed to increase “efficiency” at scale. Interventions in these chains are potentially very powerful given the “upstream” nature of the leverage points that can then have a multiplier effect. However, interventions in such chains must be carefully assessed given the potential for substitutions and transformations of foods and their ingredients through the chain (Hawkes et al., 2012).

METHODS FOR ANALYSING COHERENCE BETWEEN POLICIES TO PROMOTE HEALTHIER EATING AND AGRICULTURE AND FOOD SYSTEMS

The assessment of whether policies to promote healthy diets are coherent or incoherent with agrifood systems is a very nascent area. Analysing coherence requires the identification of:

1. How policies to promote healthy diets affect the upstream agrifood system, and/or;
2. The ways in which existing agrifood policies reinforce, present barriers, and/or undermine policies to promote healthy eating, and/or;
3. What specific policy interventions could lever agricultural production, and the food supply chain to positively influence food education and skills and the food market environment.

Several inter-related methods are emerging to identify these aspects of coherence, including the ‘problem-tree’ method, consumption-oriented food supply chain analysis and value chain analysis. These methods can be used for analysing both short- and long chains.

The *problem and solution tree method* utilises multi-stakeholder focus groups and interviews and can be complemented by economic modelling to assess the possible links between aspects of the food supply chain and NCD risk. Problem trees are used to assess how poor dietary practices could be developing due to triggers or inactions further up the food supply chain, and so assist with assessing the barriers and opportunities in the food supply chain to achieving dietary objectives. The method brings together a multi-sectoral stakeholder group of stakeholders from across multiple government and non-government sectors (Snowdon et al., 2008). Starting from problem dietary issues in the country, whether it be high intake of sugar-sweetened beverages or low intake of fruit, stakeholders consider what factors may be contributing to this, in the areas of availability, accessibility and affordability. Using the trigger question ‘why’, they work back to assess causes of causes. For example, low price of sugary drinks may include drivers of low costs for raw ingredients, which in turn may be due to low taxes on these items. This approach has been used in Fiji and Tonga by researchers from Deakin University, Australia (Snowdon et al, 2008, 2010a; Snowdon and Swinburn, 2010). The research included assessments of low fruit and vegetable intake and high intake of

fatty processed meats and sugary drinks. The problem tree method was used to identify barriers from multiple sectors. Barriers to more effective policy were identified in the trade, commerce, finance and agriculture sectors. Many of these identified had been developed for reasons unrelated to diet, but had effects on foods supply, such as tax concessions for local industry. The stakeholders also assessed how policy solutions could be developed and their likely health/social impact, effectiveness, feasibility and acceptability (Snowdon et al., 2010a; Snowdon and Swinburn, 2008) and cost-effectiveness (Snowdon et al., 2011).

Another technique is *consumption-oriented food supply chain analysis* (Hawkes, 2012). The technique focuses on identifying how policy interventions aimed at improving the quality of the food supply may impact the food system as a whole. The methodology enables the identification of leverage points in the food supply chain where policy changes could be made with the potential to result in positive affects across the supply chain (Hammon, 2008). The idea is that identifying the upstream tipping points has the potential to re-align the incentives and disincentives in the food system with public health goals (Pinstrup-Andersen and Watson, 2011; Lang, 2009). Consumption-oriented food supply chain analysis method was recently used in India by researchers from the University of Sydney and the Public Health Foundation of India (see “fats” example below).

Figure 1 outlines the steps taken in the case study to map the food supply chain. The first step identified fat as the nutrient of interest that would be examined as part of the case study. The mapping involved describing the steps in the food chain from inputs into agriculture to consumption, describing the organisational, financial, technological and policy characteristics at each of those steps along with their corresponding incentives and disincentives. The next step analysed how these characteristics, incentives and disincentives affect the availability, affordability and acceptability of fat and how these incentives or disincentives could be leveraged to improve the quality of fat in the food supply. A combination of using existing data (i.e., Euromonitor, FAO), document analysis (i.e., annual reports, budget statements, policy documents) and conducting interviews with key stakeholders from multiple sectors was used to obtain the necessary information to complete the food supply chain mapping.

After completing a comprehensive map of the food supply chain, a combination of problem and solution trees were used to identify points in the supply chain where potential interventions could be directed. Problem areas in the chain were identified by examining where existing characteristics, incentives or disincentives had a detrimental effect on the availability, affordability and acceptability of both healthy (unsaturated) and unhealthy (saturated and trans) fats in India. In some cases, incentives or disincentives aligned with each other at specific points in the supply chain. A combination of problem/solution trees and logic models already described was then used to identify potential policy interventions aimed at improving the quality of fat in the Indian food supply (Snowdon et al 2008; Snowdon et al., 2010a,b).

The last step in the food supply chain analysis was to examine the feasibility of the proposed policy interventions. Semi-structured interviews with key informants from multiple sectors were used to examine the political and cultural acceptability and trade-related legal feasibility of the proposed policy options (Snowdon et al., 2010a). After completing the food supply chain analysis, a number of potentially feasible policy options to improve the quality of fat in the Indian food supply were identified.

Given that throughout the mapping process detailed information about the broader components of the policy process including content, context and actors were obtained from stakeholder interviews and document analysis, a policy analysis component was also incorporated into the methodology (Walt et al, 2008; Walt and Gilson, 1994). The policy analysis examined the complexity of improving the quality of fats in the Indian food supply (Downs et al., 2012).

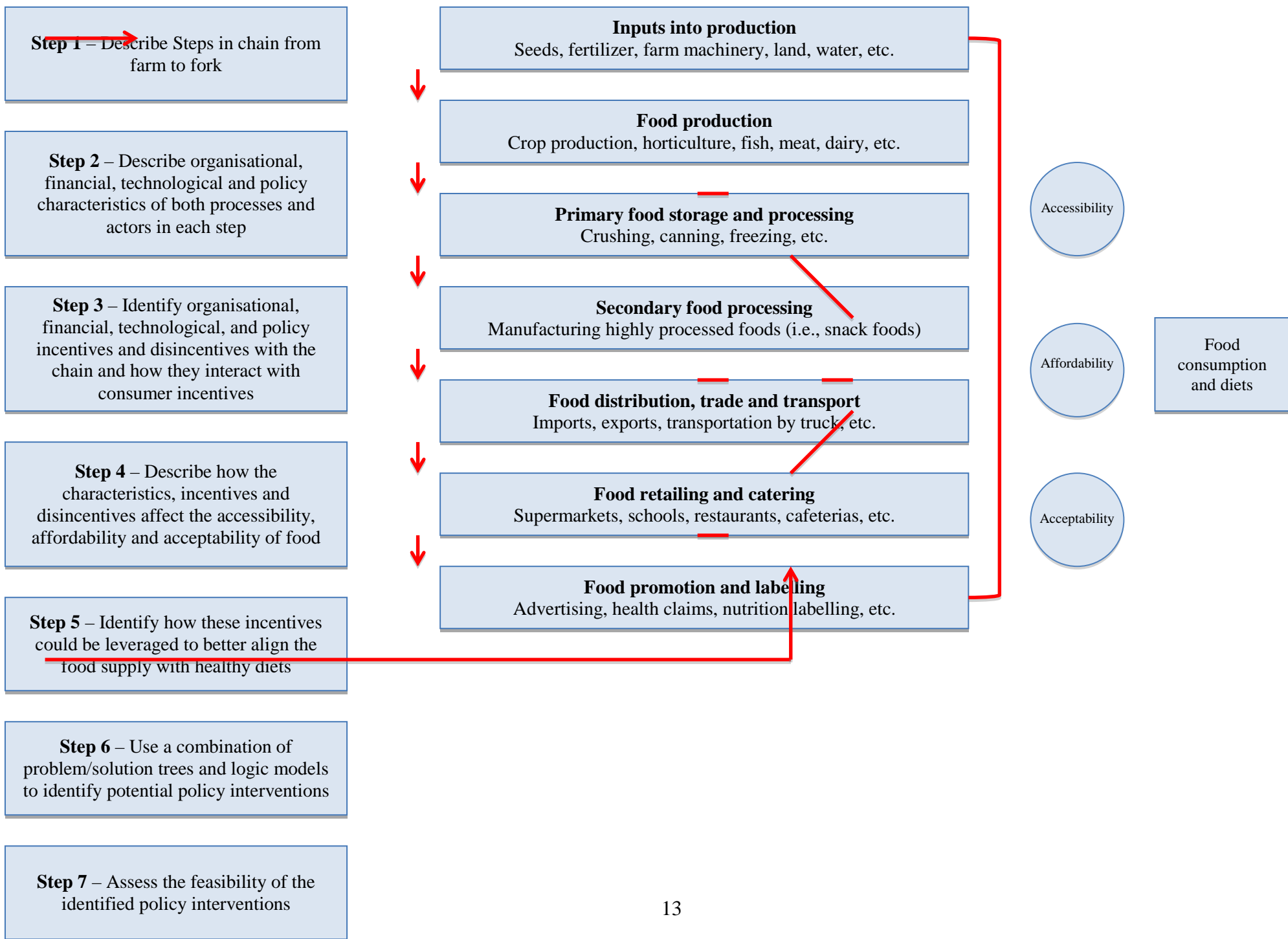


Figure 1. Steps for mapping the food supply using consumption-oriented food supply chain analysis (Downs et al, forthcoming)

A third, and related technique is *value chain analysis* (Hawkes and Ruel, 2011), which has recently been used in Fiji by researchers from the Leverhulme Centre for Integrative Research in Agriculture and Health and the London School of Hygiene and Tropical Medicine. The problem and solution tree research already conducted in the Pacific, as already described above, suggested intervention into Fiji's food supply could avert diet-related NCD deaths by increasing intake of fruit and vegetables (Snowdon et al. 2011), but further evidence of the best-possible interventions is necessary.

To support the need for more evidence, a nutrition-sensitive value chain analysis of the fruit and vegetable sector was carried out in 2012-13. The aim was to determine how fruit and vegetable value chains contribute to product availability, affordability, and acceptability for urban Fijians and to assess the benefit of value chain analysis in identifying opportunities for intervention for nutrition.

The study design was based on the approach commonly used in the management sciences to find ways to increase the competitive advantage of a product or product group. This application of value chain analysis is explicitly consumer-facing, focusing first on understanding what consumers value and then assessing a chain's performance relative to the how effectively and efficiently it delivers that value. As a diagnostic methodology aimed at uncovering opportunities to optimise the supply of and demand for certain products relative to others, it holds considerable potential for the identification of solutions to challenging nutrition problems such as low fruit and vegetable intake.

The case study had four steps: product selection, consumer research, value chain mapping, and detailed investigation of the chain. First, through consultation with local partners and a review of national nutrition data, three locally-produced "exemplar" products were selected to be the focus of the research. The selection process considered nutritional and value chain characteristics, as well as the diet patterns of the major local ethnic groups. Following this, focus group discussions were held with urban Fijians to establish the fruit and vegetable attributes acceptable to and valued by consumers. Third, a series of structured workshops were facilitated with chain actors and stakeholders to map the most important chains delivering the exemplar products to urban consumers. Finally, semi-structured interviews with chain actors and direct observation of the chains were used to assess chain performance and identify opportunities for improving competitiveness.

Through a focus on the delivery of consumer value, this case study identified several points in the exemplar chains where targeted intervention could lead to improvements in the availability, affordability, and acceptability of the products to urban Fijians. In so doing, it provides critical evidence to support potential action for improving nutrition in Fiji and suggests a benefit to the use of value chain analysis as a tool for identifying food system solutions to diet-related NCDs.

EXAMPLES OF ANALYSIS AND INTERVENTION TO SUPPORT POLICY COHERENCE BETWEEN ACTIONS TO PROMOTE HEALTHIER EATING AND AGRICULTURE AND FOOD SYSTEMS

Areas of focus in short chains and long chains

To date, examples of short chain approaches are homestead and community food production, and the use of schools to increase market access for agricultural producers. In these cases, policies and programmes have been designed to directly lever agricultural production, and the food supply chain, to positively influence food education and skills and the food market environment.

No such specific examples exist from long chain approaches; the idea of leveraging long chains for healthy eating is relatively new. In these cases, then, the issues largely concern how policies to promote healthy diets affect the upstream agrifood system, and/or the ways in which existing agrifood policies reinforce, present barriers, and/or undermine policies to promote healthy eating. Good examples come from fats, and taxes and trade.

Short value chains – homestead and community food production

One notable set of policy interventions designed to lever agricultural production and the food supply chain to positively influence food education and skills and the food market environment is through “homestead” or community food production. In this “short chain” approach, local gardening and growing is encouraged with the intention that what is produced – or at least some of it – will be consumed directly by the growers, their families and their immediate community. These interventions also often aim to use food production as a space for nutrition and agricultural education – what foods is, where it comes from, and how to grow it. The intention is thus both to provide food education and skills as well as changing the food market environment (that is, the availability, affordability and acceptability of the produced food).

The approach is very similar to the interventions designed to alleviate inadequate intake of micronutrients in communities characterised by malnutrition (Ruel et al, 2013). These interventions focus on producing micronutrient-rich foods (e.g. livestock, fish, fruits and vegetables), as well as providing education and skills. Such interventions have increased considerably in the past 20 years as part of “food-based” approaches to addressing undernutrition, particularly micronutrient deficiencies (Thompson and Amoroso, 2011).

Examples of these short-chain approaches to encourage healthier diets in a NCD context are beginning to emerge. Recent reviews of policy actions to encourage healthy eating around the world have identified the promotion of school gardening and urban agriculture as the main actions to ensure the availability and accessibility of fruit and vegetables in low- and middle-income countries (Lachat, 2013). Notable examples come from small island states. For

example, in the Federated States of Micronesia, the NGO “Island Food Community of Pohnpei” was established in 2003 (Island Food Community of Pohnpei, 2013). Its mission is to promote the production, consumption, local marketing of locally grown island foods to both attain a greater degree of food security and help protect against vitamin deficiencies, diabetes, heart disease and anaemia. The NGO works to motivate local farmers to sustainably increase production of nutrient-rich crops for use in the home and sale at local markets. In Nauru, the Horticulture Project aims to address the high incidence of diabetes by encouraging a healthier lifestyle. Part of the project aims to promote five varieties of fruit and vegetable suitable for cultivation, as well as “import substitution” (that is, the consumption of domestic rather than imported goods). It involves introducing horticulture skills that use local planting materials for cultivation and plans to support the Eat Healthy, Live Healthy program by distributing vegetables to provide free breakfasts to 800 schoolchildren per week (ICDF, 2011).

In the Caribbean, the Caribbean Farmers Network (CaFAN) is a regional NGO comprised of farmers’ organizations that collectively represent over 500,000 smallholder farmers across 15 Caribbean countries (CaFAN, 2011). Since 2002 with the support of the Technical Centre for Agricultural and Rural Cooperation, CaFAN has been working to enhance Caribbean food and nutrition security alongside enhancing farmers livelihoods in the context of very high rates of NCDs. One of their projects aims to promote the consumption of local roots and tubers among local people, while also contributing to import substitution. The project is reported to have successfully boosted the production of roots and tubers in four member countries through training and capacity building initiatives, sharing experiences and best practices, and identifying new market opportunities.

School gardens have also been developing over the past 20 years in what is termed “garden-based nutrition education.” FAO characterizes school gardens as having two things in common (FAO, 2006):

- School children actively help parents and other interested community member in creating and maintaining the garden, and;
- School children use the garden - for learning, for recreation and by eating what is harvested.

National school gardening initiatives have been set up in a range of countries – such as the Bahamas, Brazil, El Salvador, Honduras, Nicaragua and South Africa – where the emphasis is typically on increasing fruit and vegetable consumption. While the focus has tended to be on micronutrient deficiencies, they clearly also have implications for healthier eating more broadly. In the high-income countries, garden-based nutrition education is gaining increasing credibility as a health intervention. In the UK, for example, the Royal Horticultural Society has a Campaign for School Gardening. In the US, NGOs have developed garden- based

nutrition education curriculum for use in schools with the goal of encouraging greater fruits and vegetable consumption among children (Healthy School Environment, 2012). Home and school gardens have also been popularised by public figures like First Lady Michelle Obama and the chef, Alice Waters.

Short value chains - schools as markets for agricultural products

The provision of fruit in schools is relatively common policy option in countries in the European (79%), Western Pacific (73%) and Americas (67%) regions of the WHO (WHO, 2013b). The provision of food in school meals is also relatively widespread.

A proportion of policies on school food provision have been implemented to achieve agricultural as well as nutrition objectives, typically through short chains (although agricultural products are also delivered into schools through long chains). The idea is that greater provision in schools increases demand, and thus sales, from the agricultural sector.

An example of the first approach is the School Fruit Scheme of the European Commission. The School Fruit Scheme, initiated in 2009, is designed to increase fruit and vegetable consumption among children while also stabilising EU fruit and vegetables markets. The Scheme involves co-funding national school fruit programmes. In 2010/11, the Scheme had been taken up by 24 of the 27 Member States of the European Union (European Commission, 2012b). It is reported to have reached 8,146,290 children (equal to 25% of all children in the focused target group within the participating countries) in 54,267 schools in 2010/11.

Evaluation of the School Fruit Scheme has found that it has had small but positive outcomes for horticultural production in the European Union (AFC Management Consulting/Co Concept Marketing Consulting, 2012). It is credited with creating additional demand for fruit and vegetables by 43,730 tons in 2010/11, representing 0.06% of the total gross net supply in the EU 27 fruit and vegetables market. Evaluations also show that national initiatives have led to an increase in the amount of fruits and vegetables consumed by children, at least over the short-term. In addition, around 20 countries use the Scheme as an opportunity to educate children about food and agriculture, such as through farm visits and school gardening (AFC Management Consulting/Co Concept Marketing Consulting, 2012).

The Scheme has also been evaluated according to its policy coherence, finding that it is directly coherent with the targets of the Single Common Market Organisation of the EU's Common Agricultural Policy. This is because the Scheme aims to contribute to stabilizing EU fruit and vegetable markets, and thereby increase the income of European farmers (AFC Management Consulting/Co Concept Marketing Consulting, 2012).

An example of a policy implemented with specific provisions to support farmers comes from Brazil. Brazil is one of the few countries in the world with a universal and free school feeding program (Programa de Alimentação Escolar, or PNAE). With the aims of “meeting the nutritional needs of students while at school, contributing to the growth, development, learning and academic achievement of students, and promoting the formation of healthy eating habits”, it now serves 45.6 million students with a budget of 3.1 billion Reais (FNDE 2010). The PNAE has undergone several structural changes since its inception in 1955, most recently with a new law signed in June 2009. Law 11,947 extends the school meal program to all people engaged in basic education, provides a framework for increasing the per capita expenditure per student, specifies that nutritionists should be responsible for the menus, and stipulates that 30% of the food budget should be used to purchase foods directly from family farms (Diário de Oficial da União, 2009). Specifically, Article 14 states that (except under specific circumstances):

At least 30% of the foods in school meals should be purchased directly from family farms and local rural enterprises, giving priority to the resettled farmers (former landless people), traditional indigenous communities and “quilombolas” as a means of supporting local economic development (page 2)

The Article thus explicitly connects the agricultural sectors – and family farming in particular – with school meals. The products sourced from family farms are not restricted to fruits and vegetables, nor any food. However, one of the reasons for initiating the development of the law was the improved quality of school meals. Reviews of menus had shown that in 2006 showed that 41% and 16% of meals served through the PNAE did not contain any fruit or vegetables in any one week. An earlier study in 2004 of 1000 schools also identified inadequate servings of fruits and vegetables relative to availability of artificial juices (found in 59% of schools). This relative lack of “fresh” foods is directly related to the original structure of food provision in the PNAE, which was centralised, involving the distribution of pre-packaged (often dehydrated) foods from central locations to all regions of Brazil. It was difficult for schools to source direct from farmers because the public procurement law of 1993 required a highly competitive bidding process that generally had the effect of mitigating against family farmers and favouring procurement from larger, capital intensive entities (although there was a small provision permitting direct sales) (Belik et al 2004).

The law, which had been initiated by the National Council of Food and Nutrition Security (CONSEA), thus aimed to increase access to markets for family farmers while increasing the quality of the food served in meals (but with less explicit emphasis on nutrition). The law was strongly supported by a coalition of family farm advocates on the basis that it increased their

access to a stable market, thereby increasing income and reducing poverty, as well as by politicians concerned with improving economic development in local rural economies.

Long value chains - fats

Globally, the WHO includes on its list of policy options for promoting healthy diets the replacement of saturated fats and trans fat with unsaturated fats, and reducing the energy density of foods (WHO, 2013a). However, as already reviewed, relatively few countries have policies design to decrease fat intake, whether this be total, saturated and/or trans fats.

Historically, policies designed to encourage substitution for one fat to another have typically included some form of interventions in the food supply chain. These policies date from 20-40 years ago. In 1975/6, Norway adopted an agriculture-food-nutrition policy. One of its aims was to reduce overall fat consumption, including replacing saturated fats with polyunsaturated fats, whole grains, and vegetables (Milio, 1981). The agricultural and food system component included gradually shifting of food subsidies to favour skimmed relative to whole milk, and agricultural research to breed cows for lower fat milk. In 1972, Finland initiated its North Karelia project to address high rates of cardiovascular diseases in the region and high intake of saturated fats. The project included some agrifood system measures, including assistance to producers to transition away from dairy to berries, agricultural research to produce a domestic rapeseed oil, and close collaboration with manufacturers of vegetable oil-containing products (Puska et al, 2009). In 1987, Mauritius introduced a regulatory policy for general cooking oil to limit the content of palm oil and replace it with soybean oil (Uusitalo et al, 1996).

All of these policies involved the national sourcing of fats. Today, fat supply chains have become far longer, more complex and increasingly globalised. Moreover, evidence suggests that there is not coherence between policies aiming to reduce fats intake (or encourage substitution) and agrifood policies. This is well-illustrated by the case of India. In India, the main source of trans fat is a partially hydrogenated vegetable oil (PHVO) called vanaspati. Vanaspati is a vegetable ghee used in bakery products, fried snacks, street vendor food and as a cooking oil in the northern states (L'Abbe et al, 2009; Agrawal et al, 2008; Ghafoorunissa, 2008). In response to the high levels of trans fat in vanaspati, in 2010 the Food Safety and Standards Authority of India (FSSAI) proposed a regulation that sets an upper limit of 10% trans fat in PHVOs to be further reduced to 5% over three years (FSSAI, 2010). In addition, the proposed regulation includes mandatory labelling of both saturated and trans fat. Although there has been an extensive consultation process related to the regulation, it has yet to be passed by the central government.

If passed, the regulation has direct implications for the fats supply chain in India: users of trans fats – including food industry, street vendors and consumers – will need to replace PHVOs with alternative oils (or use vanaspati with reduced trans fat content which may have

different properties than the original product), both as cooking oils and for use in processed products. Despite the WHO's suggestion of replacing trans fat with unsaturated fats (WHO, 2013b), the results of a study conducted by researchers at the University of Sydney in collaboration with the Public Health Foundation of India suggests that without improved coherence with policies on the supply side, this is unlikely.

Interviews conducted by the researchers with stakeholders from industry, agriculture, trade and processors indicated that there would be a reliance on reformulating using palm oil – an oil high in saturated fats – owing to its relatively lower price. Currently, approximately 50% of vegetable oils available in the country are obtained from imports - of which approximately 80% is palm oil from Indonesia and Malaysia (Directorate of Vanaspati, Vegetable Oils and Fats, 2013; Department of Agriculture and Co-operation, 2011). More specifically, in 2011-12 18.9 million tonnes of edible oils were available in the country, of which only 9 million tonnes came from domestic sources (Directorate of Vanaspati, Vegetable Oils and Fats, 2013). Palm oil is favoured given its low cost and its high availability. A typical response from the interviewees was that the underlying need “to make economically viable products that do not have trans fat” as the reasoning behind the preference for using palm oil. Replacing PHVOs high in trans fat with oils high in saturated fats such as palm oil would provide limited health benefits (Mozaffarian et al 2010; Siri-Tarino et al 2010). In order to increase the likelihood that this would be possible in India, increased productivity of oils produced domestically will be necessary; however, domestic production is currently being undermined by the availability of cheap imports (Bhalla & Singh, 2010).

To improve the likelihood that industry will replace trans fat with healthier oils it will be necessary to increase the Indian supply of these oils and to lower their cost to compete with palm oil. Directing agriculture policies at improving the quality of domestic oils and fats could have the potential to improve the quality of the food supply since these oils (e.g. peanut, rapeseed, cottonseed), are higher in mono- and polyunsaturated fats. However, the Indian Government has now begun its own palm production program. The purpose is to reduce reliance on Malaysian and Indonesian imports and support the development of a very high-yielding and low cost oil. The Oil Palm Development Program (OPDP) provides various incentives for palm oil production (as well as oilseeds, pulses and maize) (Department of Agriculture and Co-operation, 2004). In addition to the OPDP, the government has more recently begun the Special Programme on Oil Palm Area Expansion (OPAE) given the still very low levels of production in India (Department of Agriculture and Co-operation, 2011). Under the OPAE the government is providing incentives for setting up oil palm processing units, new seed gardens, protecting growers against fall in prices, reviewing the existing pricing formula, and identifying new areas for oil palm cultivation, plus a range of incentives for growers to purchase inputs that will increase productivity (Department of Agriculture and Co-operation, 2011).

This situation in India echoes the global picture. Palm oil is the world's most used vegetable oil (46.8 million tonnes in 2010) (Product Board MVO, 2010). 85% is produced in Indonesia and Malaysia (World Bank/IFC, 2011). Both countries implement input, production and trade policies to promote production and export, including research funding, the opening of new and degraded lands for cultivation, lower limits on plantation size, schemes for smallholders, incentives for private sector investment and lower export taxes (Hawkes, 2010). Moreover, the World Bank Group has a policy of investing in palm oil production. Between 1965 – 2007, the World Bank invested US\$ 1848.8 billion in palm oil, of which US\$618.18 million was in Indonesia, Between 1990-2007, the International Finance Corporation invested US\$168.5 million in Indonesia alone, more than double next leading country (WB/IFC, 2011).

Long value chains - fiscal policy

Another example of a policy that has implications for the activities and actors in the food supply chain are health-related food taxes. As reviewed above, government interest in health-related foods taxes have burgeoned in recent years, driven, at least in part, by their potential, fiscal benefits. Public health research indicates that while the outcomes are not fully predictable owing to substitution effects, fiscal policy measures (taxes and subsidies) are likely to be an effective intervention to improve consumption patterns associated with obesity and chronic disease, provided they are well-designed (OCED 2012; Hawkes, 2012). Turning upstream, taxes also have implications on the food supply. Considering the effect of public health nutrition taxes and subsidies on the value chain may help to develop more feasible policies.

Most public health studies base their estimate of effect on an assumption that the fiscal measure is passed fully to the consumer. However, one study which has investigated industry response suggests that strategic pricing of firms is very important in determining the effect of taxes or subsidies on price (Bonnet and Réquillart 2012). It may be possible for industry to respond to a tax by absorbing the tax itself or passing on only a partial component of the tax. Only two studies have investigated industry response to an actual tax, both being case studies of the effect of removing a tax (implicit subsidies) on soft drinks (Bahl, Bird et al. 2003; Bonnet and Réquillart 2012). One study of found overshifting, where the discount passed to consumers was greater than the tax removed (Bonnet and Réquillart 2012) and the other (earlier) study found undershifting, where the discount passed to consumers was less than the tax removed (Bahl, Bird et al. 2003). The industry backlash to the saturated fat tax implemented by Denmark indicates that it is essential to consider not just the effect on industry but also the influence and power of the industries affected. By targeting fat, this tax

affected the meat, dairy and processed food industries, which together contribute substantially to the food economy.

Taxes and subsidies may also create incentives for reformulation of unhealthy commodities, such that the fiscal measure would be reduced. However, this is more likely to be the case if the intervention is applied in such a way that it differentiates between healthier and less healthy options. For example, taxes applied based on sugar or fat content, in which the tax is higher for foods and beverages containing higher quantities of the target nutrient.

The tax policy and administrative context is also an important component of feasibility. The priorities of tax policy makers include: streamlining of taxes, adoption of value-added tax (VAT), minimisation of excise taxes (except to correct for externalities) and removal of import taxes in line with trade liberalisation policies. Proposals for public health nutrition taxation should (i) use existing types and rates of taxes where possible, (ii) use excise taxes that specifically address externalities, (iii) avoid differential VAT on foods and (iv) use import taxes in ways that comply with trade liberalisation priorities (Thow, Heywood et al. 2011a).

Analyses of existing fiscal policy intervention to reduce soft drink consumption in Pacific Island Countries indicates that issues of agenda setting, policy coherence between sectors (e.g. trade liberalization) and practicalities of administration are very important. Simple administration processes, ideally using existing mechanisms such as excise taxes, and the application of non-discriminatory taxes contributed to policy success. Three interventions were explicitly for health purposes (Samoa, Nauru and French Polynesia taxes), and this cross sectoral engagement engendered widespread support for the taxes. Limited data on the effect of these taxes indicates that there was a resultant increase in price, and that this contributed to soft drinks being more expensive than close substitutes, such as bottled water. This suggests that such fiscal policy intervention could be effective in changing incentives for consumers and manufacturers (Thow et al, 2011).

Long value chains – trade policy

As mentioned, previous work on trade liberalization has identified one of the downstream outcomes for food and nutrition as a reduction in the affordability and increase in the availability of highly processed foods, meats and dairy products (Thow & Hawkes 2009; Thow, Heywood et al 2011). Increasing consumption of these foods has been associated with NCDs. As such, trade policies can have specific downstream repercussions for the food environment.

With respect to trade, there are also examples of interventions that seek to directly utilise trade policy to reduce the availability and affordability of less healthy foods. As reviewed

above, three Pacific Island countries have attempted to moderate their food supply by banning imports of fatty meats (Thow and Snowdon, 2010). These bans, however, face legal challenges on the basis that there are other, less trade distorting means of achieving the same objective (e.g. taxes) Thow et al (in press) and countries may be limited in raising tariffs beyond agreed bound rates (Fidler, 2010).

Another means of leveraging trade – and staying within trade rules – is to investigate where there might be potential for health to support and encourage local and international trade in healthier commodities; for example, to make it easier to supply fruits and vegetables. Indeed, international trade in fruits and vegetables has expanded at a higher rate than trade in other agricultural commodities since the 1980s. Not only has world trade in fruits and vegetables gained prominence, but also the variety of commodities has expanded. Over the years, three regions – the European Union (EU), the North American Free Trade Agreement (NAFTA) area and Asia (East, Southeast and South) – have remained as both the major destinations and sources of supply.

Today, many low and middle income countries face policy-related and structural barriers to fruit and vegetable production and availability. The main barriers to fruit and vegetable supply are: technical impediments to improving produce quality (which limits saleability); infrastructural deficits affecting production (e.g. poor irrigation); problems with postharvest storage and processing (e.g. inadequate refrigeration capacity); and transport difficulties (e.g. bad roads). All of these result in product volumes that are unreliable and unable to fulfil major buyers' orders and market demand. Many of these barriers, which are caused by a lack of agricultural capacity and infrastructure resulting from years of underinvestment, affect production.

Thow and Priyadarshi (Thow and Priyadarshi 2013) used consumption-oriented food supply chain analysis to assess barriers and opportunities to increase the supply of fruit and vegetables in the Aid for Trade Initiative. Aid for Trade is a World Trade Organisation (WTO) initiative that “helps developing countries, and particularly least developed countries, trade. Many developing countries face a range of supply-side and trade-related infrastructure obstacles which constrains their ability to engage in international trade” (WTO, 2013).

The analysis identified the main avenues for Aid for Trade investment to increase fruit and vegetable supply as: (i) facilitating producer access to technical assistance to improve the quality of produce, (ii) improving infrastructure to enable the efficient transfer of produce from producers to markets, and (iii) helping governments to develop effective supportive policies and improve processes for agricultural production and export.

Health departments should make central planning and finance departments aware of the potential health and economic benefits, for both developed and developing countries, of directing Aid for Trade to fresh produce markets. The analysis also highlighted the practical

and administrative benefits of utilising existing channels of expertise and funding. Aid for Trade provides a framework for strengthening food production capacity, infrastructure and accountability. To maximize intersectoral collaboration and policy coherence, health policy-makers and advocates need to be familiar with the language and priorities of the trade and development sectors. This case study on Aid for Trade also highlights the potential for feasible, focused strategies to initiate a dialogue between health and other sectors to support future collaboration. Policy-makers and practitioners in different sectors pursue different aims and their priorities differ. Identifying focused strategies can pave the way for dialogue leading to future collaboration.

DISCUSSION

These examples show that analysis of agrifood value chains can help to identify opportunities for the upstream intervention that is called for in the WHO Global Action Plan for NCDs. Tackling upstream incentives and disincentives will be necessary to improve the food environment in ways that support growing action on consumer facing policies for healthy diets.

The examples presented here also illustrate the specific and tangible effects that upstream policy decisions can have on availability and affordability of foods associated with NCDs. They also illustrate the likely upstream effects of consumer-facing intervention. This highlights the importance of public health engagement to investigate the food supply implications intervention.

These case studies also suggest that there are opportunities to work with agriculture-related policy agendas to identify opportunities for improving coherence. There is already significant intervention in the food supply chain, which provides a range of opportunities for engaging with existing forums and agendas to improve outcomes for all affected sectors, including nutrition and NCDs.

It is clear that to promote healthy eating, nutrition and health policy makers are implementing consumer-facing healthy diet policies with implications for the upstream agrifood sector. Likewise, agricultural and food policy makers are implementing policies with downstream implications for food markets, and policies that aim to influence those markets. Thus it would be more effective to work together to implement policies in the agrifood system in order to benefit both nutrition and agriculture.

RECOMMENDATIONS

UN agencies and the international financial institutions. The WHO, FAO and other UN agencies should develop an effective interagency mechanism to realize the commitments included in recently adopted WHO Global Action Plan for NCDs (2013-2020) and the UN Political Declaration on NCDs. Key tasks of this interagency mechanism should be 1) to identify a clear role for international institutions concerned with agriculture and food in NCD prevention; 2) to assess coherence between international agricultural and food system policies and programmes and nutrition objectives; 3) to work to address any incoherence identified, and promote coherence.

Governments. Governments should develop a policy environment supportive of “short chains” that bring benefits for employment, income generation and poverty reduction in the agricultural sector as well as nutrition objectives. They should develop cross-government governance structures to identify how policies across government could be mutually reinforcing to prevent NCDs and bring economic benefits. This would require nurturing a commitment to nutrition in sectors rarely included in health discussions, such as commerce, trade and transport. Governments should also identify strategies for alternative livelihoods and economic opportunities for producers and workers in the food supply chain who may be impacted through the effective implementation of policies to promote healthier eating.

Private sector. Producers of fruits, vegetables, legumes, and other nutritious foods consumed in inadequate quantities should work with agricultural and health policy makers to identify opportunities to increase both market access and consumer demand among populations and the sub-groups most in need, while also generating income for private sector actors.

Civil society. NGOs concerned with nutrition should highlight policy incoherences and advocate their removal, get involved in implementation of short chain approaches, and support the implementation of measures in the food market environment to reduce demand for unhealthy diets.

Academia. The research community should develop clearer methods to identify: (i) policy coherence and incoherence between agrifood system and nutrition objectives; (ii) the impact of healthy diet policies on agrifood systems and the actors within them; and (iii) effective points of intervention in food value chains to improve the availability, affordability and acceptability of foods that promote good health, while also leading to benefits for actors in the food supply chain.

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