

# **1** Food safety challenges, informal markets, and their role in the crisis

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In this opening chapter, we look at the interaction between the COVID-19 crisis and the food chain. While the pandemic is not a “food safety issue” in the strict sense, its emergence is linked in several ways to the food chain – and to safety of supplies, in particular veterinary issues. Regardless of the still imperfectly known mechanism of SARS-Cov-2 spread to humans, understanding better the ways in which zoonoses can lead to human pandemics, as well as how regulatory systems can help with reducing such risks, is essential. Particularly essential is to identify approaches through which regulatory systems in developing and emerging economies can support improved safety in the food chain, in contexts where imposing costly rules and rigid mechanisms are likely to be of limited effectiveness.

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## Introduction

The pandemic level spread of the COVID-19 virus has generated concern and confusion, as people all over the world have tried to make sense of what was (and still is) happening, with some looking to attach blame to human agents as proxies for the invisible and totally unconcerned virus itself. A common version of the origin of the problem is that a human ate a wild animal bought in a wet market in China and acted as a conduit for this new virus to jump species from wild animals to humans. This characterises the issue as a failure of food safety regulation for allowing that danger into the food chain. This chapter examines the hypotheses about the origin of the virus and then explores the challenges to a food safety regulatory system in coping with the threat of a pandemic such as this.

First, it sets out the current scientific understanding of the origin of the virus, that it is a new version from an existing family of viruses which has mutated within a genetic reservoir in the wild, probably amongst bats, and has transferred from animals to humans. It is particularly well adapted to humans and spreads easily between humans, leading to the pandemic level of infection. The exact point of the “spill over” from animals to humans and the method of transmission is not known and is subject to some controversy. A human eating a wild animal that was infected by infected bats is a possibility, but the virus could also have transferred by touch or inhalation, without having anything to do with food or eating. The spill over may have been in the wet market in Wuhan or the spread of the virus may have been amplified by human interactions in that market but there is evidence of early cases of the infection in humans connected with that market *before* the “outbreak”.

It took fifteen years to establish the origin of an earlier virus, so it is unwise to try and be definitive at this stage about what happened as to the origin of this virus. The World Health Organisation (WHO) of the United Nations has set up an investigation, but there is much still left to investigate, and there is debate as to whether sufficient access is currently available for investigative work to be fully effective (Zarocostas, 2021<sup>[1]</sup>). Scientific research does attest to circulation of coronaviruses related to the SARS-Cov-2 of the Covid-19 pandemic in wild animals in Southern China and nearby countries (Wacharapluesadee et al., 2021<sup>[2]</sup>), but so far the precise details of the pandemic origins are still highly uncertain. But lack of the actual detail of what happened does not invalidate discussion about the relationship between food safety and pandemics such as this. Although evidence of actual connection at source is not clear, the course of this pandemic – coming after a few others – increases concerns about some parts of the food chain, in terms of security of supply and safety of the production and supply processes. These concerns should inform actions that may reduce some of the hazards that provide a context for the growth of another pandemic.

Food is so fundamental to human existence that it connects with many different areas of activity. The impact on food of diseases in animals is just one. Transmission of diseases from animals can be through food and also through other direct and indirect pathways. The possibility of one route from pathogen to food contamination does not then mean that what may be necessary to prevent that possibility should be exclusively or primarily a matter of food safety and specifically of food safety *regulation*. That said, food safety can often have bidirectional links with other development goals, in that food safety is seen as having a direct role as well as an enabling role for several of the Sustainable Development Goals (SDGs). An example of this is where food safety can directly enable SDG 3 on good health and well-being. The reverse is also true like when SDGs not directly related to food safety- like SDGs 7, 13 and 14<sup>1</sup> can, in fact, have a strengthening effect on food safety. One could argue that tackling marine pollution and promoting climate action has a bearing on food derived from marine sources and in turn can have an enabling effect on food safety. One could also assert that SDG 4 on quality education could strengthen a case for wholistic and safe nutrition from animal sources and required for cognitive development in children. Yet, on the other hand, food safety regulations can also add unnecessary burdens on achieving SDGs. For instance, food safety regulations, as non-tariff measures, can harm food exporters from lesser developed nations and thereby reduce income generation. The synergies and trade-offs are important to understand for greater

policy coherence. Food safety is an integral part of a broader and complex strategy of managing other challenges and the context in which a risk related to food safety arises may have significant socio-economic and environmental elements or may require a different way of organising a rural economy or a method of agriculture.

The paper focuses on the role of wet markets and the debate in the developing world around what is referred to as “supermarketisation”<sup>2</sup> as an illustration of how easily a food safety question strays into very complex and strategic issues. The OECD (OECD, 2021<sup>[3]</sup>) has highlighted the triple challenge food systems around the world have faced, even before the pandemic. All these three issues are complex and involve i) food security and nutrition ii) livelihoods and nutrition and iii) resource use and climate change. Policies directed at resolving these challenges come with their own synergies and trade-offs, and policy makers need to be cognizant of this. Reorganisation of rural economies, trade-offs related to farm income vs consumer prices or lowering of livestock (and consequentially protein supply) to control emissions, does not mean that these issues become part of the remit of food safety regulation, but that food safety can be *one factor* in various complex issues, whether as a consequence or as a cause of that complexity. That can sometimes lead to regulatory changes within the food safety remit which can then *contribute* to solving the wider problem (but can be no more than a *part* of the solution).

Boundaries have to be set on the scope of what is regarded as “food safety”. This is particularly the case when food safety is seen as a regulatory framework, as opposed to a branch of scientific research or a theory of development economics. As a matter of law, the scope of the regulations has to be limited and clear. But a regulatory system is more than just an abstract framework of laws and regulations. It may also have an institutional infrastructure for implementation, with significant resources and techniques for delivering change in the real world. The scope of that delivery infrastructure is arguably the key issue. Perhaps more than any other regulatory system, food safety has been wrestling with the challenge of changing common habits across huge populations. Delivering the intended regulatory outcomes of food safety regulation has become more than just delivering compliance with technical rules, especially in countries where the informal, unregulated markets provide the majority of the food consumed – and where “traditional” production methods and supply chains may predominate.

This chapter takes one such delivery infrastructure as an example – a very specific one, but highly relevant to the context of the pandemic origins: the food safety authority for India, facing the challenge of ensuring safe and wholesome food for a significant percentage of the entire world population (see Delivering food safety). It illustrates how the delivery of regulatory objectives has been transformed, from “enact and enforce” to “engage and enable”. The actual regulations have been given a different perspective to the traditional assumption of a top-down instruction that will be obeyed and will solve the problem. Their role remains as a floor for implementation policy and as an indicator of what needs to be achieved but implementation goes much wider, especially for food safety. Much of the world’s food comes from informal markets that are, by definition, unregulated but food safety regulatory delivery organisations can still apply techniques to raise practice standards. However, a key element in this modern approach is that these delivery organisations can partner with others in multidisciplinary networks to help solve some of the intractable and complex issues involving safe food, without having to restructure government Ministries and subsidiary institutions. The fundamental question is “how to improve safety”, and formal rules and regulatory systems are just one element of the answer (Blanc and Macrae, 2021<sup>[4]</sup>).

## The emerging picture of the pandemic and its connections with the food chain

There is nothing new or unusual about humans becoming ill from pathogens hosted by animals. A Zoonotic Diseases Fact Sheet<sup>3</sup> lists 26 diseases that can transmit to humans from animals (called “zoonoses” or “zoonotic diseases”). They include lethal diseases like rabies or malaria and also pathogens such as salmonella, brucellosis and shigella. Humans and animals have been co-existing for millennia and also

eating each other, so the spread of disease from one to another has been common. However, it has also been increasingly predictable and avoidable, precisely because it has been so common. Treatments have been developed to reduce the impact and practices have been applied to reduce transmission. But occasionally new zoonotic pathogens appear which have no pre-existing medical treatments and may also be lethal. If transmission can then be from human to human, once it has crossed the species barrier, it can become a pandemic.

The original transmission to a human is important in understanding the virus but of limited importance in managing its spread. This is because pathogenic organisms mutate over time and often become more virulent and harder to control. It is a coronavirus, a family of viruses that have genetic origins up to 10 000 years ago, although a common ancestor for all coronaviruses could go back millions of years (Wertheim et al., 2013<sup>[5]</sup>). Bats are seen as a natural reservoir for coronaviruses but recent transmission of novel coronaviruses to humans may have been through an intermediate host since there is little close contact between humans and bats (World Health Organization, 2020<sup>[6]</sup>). What is “novel” about this virus is that it is a new mutation of the coronavirus family, which is likely to have occurred within the genetic reservoir of host animals. SARS-CoV-2, the novel virus responsible for COVID-19, is not found in farmed or domestic animals, although they could act as an intermediary between bats and humans. The intermediary could also be a wild animal.

The source of the COVID-19 transmission is uncertain and contentious. Cases of pneumonia-type illness were identified in Wuhan, China, in December 2019 and it was identified as what is now called COVID-19. There was a clear connection between these cases and the Huanan Wholesale Seafood Market in Wuhan City and so this was assumed by many to be the source. The market sold both farmed and wild animals. This combination of factors led to an assumption that the original “spill over” from animals to humans arose from wild animals sold in that market. However, this has been challenged and the WHO is investigating the origin of the virus (World Health Organization, 2020<sup>[7]</sup>). There have been reports of cases of the virus being identified in Europe prior to the cases in Wuhan. One claims that a test of 959 people in Italy in a lung cancer screening trial between September 2019 and March 2020 showed antibodies to the virus present in some September results, although it was also argued that this did not prove that the virus did not originate in China but only that it did not start in December with the cases in Wuhan (Parodi E, 2020<sup>[8]</sup>). A report by the BBC refers to a study of wastewater from Milan and Turin on 18 December 2019 which had traces of the virus and also refers to indicators in France and Spain that the virus was present before cases in these countries were confirmed (BBC News, 2020<sup>[9]</sup>). The WHO investigation into the origin acknowledges that it can be very difficult to trace back a zoonotic spill over, recognising that it could take years.

It is possible that the COVID-19 pandemic, that has had such globally damaging results originated in humans eating wild animals which carried this mutation of the coronavirus family. That would make this the most serious outbreak of food-based illness in history. It is not a case of food-borne illness,<sup>4</sup> however, since there is no evidence that it is transmitted through food (other than eating the alleged wild animals). It is also possible that it was not food-based, through eating the animal. The proximity of humans and animals, including wild animals, in the Huanan Market allows for a zoonotic spill over but the exact route has not been ascertained. Transmission can be through various routes. Eating following cooking may not be dangerous if the cooking has killed off the virus. Avian influenza, another novel coronavirus, was transmitted from birds to humans by touch, rather than by eating.<sup>5</sup> There was little evidence of any onwards transmission from human to human (World Health Organization, 2012<sup>[10]</sup>). Other diseases, such as *campylobacter*, spread from animals by faecal matter contaminating raw food, including animal carcasses at slaughter (World Health Organization, 2020<sup>[11]</sup>).

There is no evidence of COVID-19 being food-borne and the WHO asserts that “There is currently no evidence that people can catch COVID-19 from food or food packaging” (World Health Organization, 2020<sup>[12]</sup>). In September 2020, the International Commission on Microbiological Specifications for Foods’ (ICMSF) delivered its final opinion on SARS-CoV-2 and its relationship to food safety, affirming the

unlikeliness of the virus being a food risk (Box 1.1), in the sense of being transmitted through food. The assertion regarding food packaging may be more contentious since there have been claims that the virus has spread on frozen packaging of seafood, but these claims have been challenged (Heidt A, 2020<sup>[13]</sup>). Even if these claims were true, the transmission is still not through the food itself but through frozen packaging that happens to contain food. Eating the frozen food that had been shipped would not have transmitted the virus. The food industry played an additional role in the spread of the disease insofar as many slaughterhouses became “superspreader” sources of transmission. This was attributed to the cold and damp conditions inside, the prevalence of metal surfaces, the proximity of workers and the tendency for them to shout above the normal noise (therefore increasing aerosol transmission). Some also had cramped living conditions for the workforce (Middleton, Reintjes and Lopes, 2020<sup>[14]</sup>). But there was no evidence that this led to any transmission through the food coming from these establishments, although that has also been caught up in the debate on whether the virus can be transmitted in frozen food or food packaging (Fisher D et al., 2020<sup>[15]</sup>).

### **Box 1.1. The ICMSF’s opinion on SARS-CoV-2 and its relationship to food safety**

The International Commission on Microbiological Specifications for Foods’ (ICMSF) opinion on SARS-CoV-2 and its relationship to food safety of 3 September 2020 states as follows:

“SARS-CoV-2 should not be considered a food safety hazard since a true food safety hazard enters the human body with food via the gastro-intestinal (GI) tract, where it can infect organs/tissues elsewhere in the human body.” “Despite the many billions of meals consumed and food packages handled since the beginning of the COVID-19 pandemic, to date there has not been any evidence that food, food packaging or food handling is a source or important transmission route for SARS-CoV-2 resulting in COVID-19”.

Source: (ICMSF, 2020<sup>[16]</sup>).

The novel virus mutated in the genetic animal reservoir and jumped the species to humans. Later into the pandemic, a mutated form of the virus was found in farmed minks but it has not been found in farmed animals, so it is more likely to have come from wild animals, whether alive or dead, such as bats. It could have transferred to an intermediary animal before transferring to humans. It is very well adapted to human cell receptors, which enables it to invade human cells and easily infect people. Other viruses, including others in the coronavirus family, may also have transmitted from animals to humans but had no appreciable effect so the simple fact of a zoonotic jump is not necessarily unusual. It is also a virus that transmits easily from human to human, unlike the Avian Influenza coronavirus, and allows for asymptomatic transmission, which is a very potent combination. The final factor which made this zoonotic transmission into a pandemic was the proximity to an international airport serving a large population. The Ebola virus did not convert to a pandemic on the scale of COVID-19 partly through its outbreaks occurring in less populated areas, away from highly-trafficked air routes, although it was highly infectious human-to-human. It was very lethal and very visible, unlike COVID-19 which has a high proportion of asymptomatic and “light” cases. Of all the factors in the causal chain between mutation of the virus within its genetic reservoir and the deaths of over a million people globally, the standard of food hygiene in the Huanan Market was at most a necessary but insufficient condition. That is, a higher standard of food hygiene might have prevented that causal chain, but a pandemic might still have resulted from another route. Not only is there still uncertainty about the exact sequence of events, but there is also uncertainty about whether it could have happened again elsewhere. Given the spread of the disease, further direct transmission to humans may make little difference but the Huanan Market was closed down and disinfected on 1 January 2020 and remains closed. Other markets in Wuhan reopened after the city’s shutdown ended (ABC News, 2020<sup>[17]</sup>). There still

remains an argument for improving food hygiene levels in wet markets but that argument has been widely accepted for some time. The difficulty is how to achieve it.

It should also be mentioned that the whole narrative of the Huanan Market being the source of the virus transmission has also been challenged (Cohen J, 2020<sup>[18]</sup>) (Letzter R and Writer S, 2020<sup>[19]</sup>). It took 15 years to settle the question of the source of the SARS virus, so it may take many years yet to determine the exact source of COVID-19. What does seem to be reliable is the role of that market in amplifying the spread of the virus. Whether or not the virus was transmitted for the first time from animals to humans through some action in that market, there is much clearer evidence that many of the early human cases of infection were traced back to the market (Mizumoto, Kagaya and Chowell, 2020<sup>[20]</sup>). That could be a feature of a crowded enclosed space which happened to be a food market or there may be other factors related to being a food market that made it more likely that it would amplify transmission, such as diversity of attendees from different districts or a greater than usual number of common touch surfaces.

## **The “One Health” approach and its potential to contribute to pandemic risk management**

The previous chapter showed that COVID-19 was not necessarily a food safety issue and had greater trappings of a public health issue – but that does not mean that the food chain has no relevance in pandemic risk mitigation. Although it may have its origin in the food chain, insofar as it may have been transmitted to humans through eating or the proximity with animals gathered for food sale, the transmission may have had nothing to do with eating. There is no evidence that it is a food-borne illness, i.e. that it is capable of being transmitted through food, and such evidence is bound to have emerged within a short time after the outbreak. The connection with food-borne illness is only through packaging of food and whether even that is the case is contentious. The source of the pandemic may have been a food market but even that has not been fully ascertained and may not be for years. What can be asserted is that a particular food market had an amplifying effect on transmission but that may not have been because of anything exceptional about it being a food market. So, it is far from clear from this case that preventing the next pandemic is a food safety risk that should be managed as such.

This, however, may be taking too narrow a view of the scope of the topic of food safety, and not considering the broader impact of the food chain on health, and specifically on zoonotic and pandemic risks. At its narrowest, food safety is about protecting consumers against unsafe food. However, to achieve that can stretch the scope to an unmanageable extent. Eating is fundamental to human life and therefore a large part of human resource and activity goes into providing food. It is one of the most basic markets in any society, as well as one of the most global in the present day. Food that kills or sickens defeats the purpose so ensuring the safety of food is a basic task within the activity of providing food, whether production, distribution, catering or even domestic cooking. Preventing zoonotic transfer of a dangerous virus into the food supply can clearly come within that scope but the issue is less one of the outcome to be achieved as the scope of what needs to be done to achieve it. The fact that some change may result in safer food is not sufficient to bring that activity within the regulatory remit of food safety. Reducing world poverty will result in safer food but that does not extend the food safety regulatory remit to include anything that reduces world poverty.

To illustrate the relevance of food safety to many human activities, Box 1.2 lists the number of the Sustainable Development Goals (SDGs) that are affected by actions taken as part of ensuring food safety. That does not mean that all these SDGs are part of the regulatory remit of food safety but, just as efforts to deliver food safety will assist in achieving these SDGs, working towards these SDGs may also improve food safety through improving the context in which the food safety factors operate. It is this bi-directional interaction that is the complicating factor (including the complication that the interaction may sometimes be negative). Scientific research into pathogens or bacteria that may reside in food are direct applications

of food safety for its own sake whereas changing how humans relate to animals in order to reduce zoonotic disease go much wider than efforts to improve food safety, even though food safety may improve as a result.

### Box 1.2. Food safety and the Sustainable Development Goals

Food safety will be vital for achieving many of the Sustainable Development Goals (SDGs), and particularly the following:

- SDG 1: End poverty. Foodborne disease (FBD) is a major cause of ill-health among the poor and is associated with a range of costs affecting them, including lost workdays, out-of-pocket expenses, and reduced value of livestock and other assets.
- SDG 2: End hunger. FBD has multiple complex interactions with nutrition. For example, toxins may directly lead to malnutrition, some of the most nutritious foods are the most implicated in FBD, and concerns over food safety may lead consumers to shift consumption away from nutritious foods.
- SDG 3: Good health and well-being. The health burden of FBD is comparable to that of malaria, HIV/AIDS, and tuberculosis, and the people most vulnerable to FBD are infants, pregnant women, the elderly, and those with compromised immunity.
- SDG 5: Gender equality. Women are the gatekeepers of household food safety, play important roles in traditional food chains, and often derive their livelihood in agri-food value chains.
- SDG 6: Clean water and sanitation. Lack of clean water increases the risk of food being unsafe, injudicious use of chemicals in food production can pollute water sources, and infectious FBDs can be transmitted via water.
- SDG 8: Decent work and economic growth. Inclusive food markets provide livelihoods and are a way out of poverty for many poor people.
- SDG 11: Sustainable cities and communities. Hundreds of millions of poor people work in urban agriculture and food-related services, and vibrant traditional food markets and street food make important contributions to culture, tourism, and liveable cities.

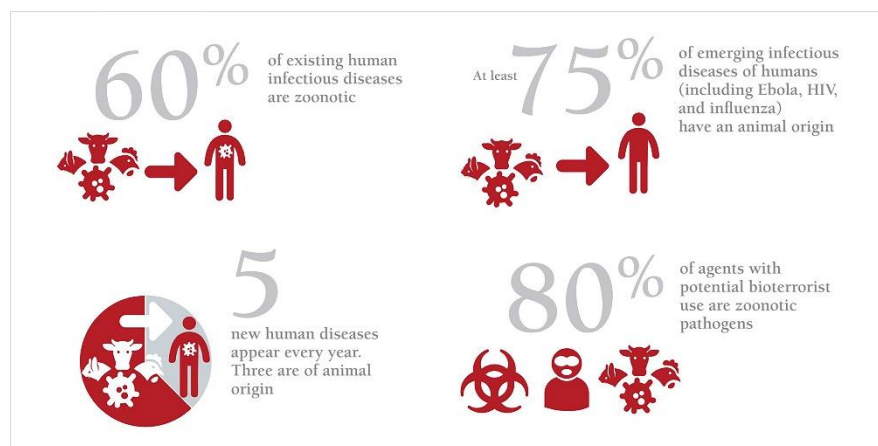
Source: (Jaffee et al., 2019<sup>[21]</sup>).

At its narrowest, food safety is about preventing “unsafe” food, whether from contamination or even deliberate adulteration by businesses. But even with that narrow definition, a wild animal carrying a dangerous virus would constitute “unsafe” food, if it could be regarded as “food”. Following the concern over the Wuhan outbreak, various Chinese cities banned the eating and, in some cases, farming of wild animals. Yet, in many countries owing to socio-economic factors, food safety standards do not apply to wild meat. Food safety regulations become more complicated as details are considered. The concept of “wild” animal is too vague. Some religions ban the eating of specific animals, with pig meat being the most familiar, and there are also strong cultural pressures about eating particular species which are happily eaten in other cultures, such as horses or dogs. But contrasting “wild” with “farmed” is more helpful and gives a more rational foundation on the basis that farming allows some level of control of the animal as a source of food. Banning the farming of wild animals therefore seems a contradiction, although it may be a matter of degree.<sup>6</sup> Banning the trade in “wild” animals avoids the complication of farming but there are already bans on the trade in many animals, primarily under the CITES Convention, although that focuses on endangered species (CITES, 2021<sup>[22]</sup>). Following the COVID-19 outbreak, some Chinese authorities

are now trying more targeted regulation based on species or a range of activities related to interaction with various species.<sup>7</sup>

An alternative approach to the problem of zoonotic disease has operated since the early 2000's, under the heading of "One Health". It is a collaborative, multisectoral, and transdisciplinary approach – working at the local, regional, national, and global levels – with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment (Centers for Disease Control and Prevention, 2018<sup>[23]</sup>). The animal element is actively supported by the World Organisation for Animal Health (OIE), and their website gives a clear argument based on zoonotic disease, summarised in Figure 1.1 below (World Organisation for Animal Health, 2021<sup>[24]</sup>).

**Figure 1.1. Impact of zoonoses**



Source: (World Organisation for Animal Health, 2021<sup>[24]</sup>).

The WHO also supports the One Health approach, partly for zoonotic disease but additionally for the new danger of antimicrobial resistance,<sup>8</sup> which it sees as another interface between human and animal worlds (World Health Organization, 2017<sup>[25]</sup>). The US Centers for Disease Control and Prevention (CDC) take it even further in looking at environmental changes and demographic shifts which alter the physical interface between humans and animals as habitats change and more humans have greater exposure to wild animals. This is a logical extension, but it illustrates how easily one subject can expand. One Health is not a specific discipline, like food safety, but rather an approach to take in a collection of disciplines, to be aware of each discipline's interaction and effects on others. As regards food safety, the OIE diagram at Figure 1.1 refers to diseases, rather than food-borne illness or food-related illness, therefore goes much wider. But the diseases are results of pathogens which may also affect food. For food safety, the issue is the generating of these pathogens in animal gene pools and this has been fundamental to the study and practice of food safety. Foods of animal origin always carry a higher risk than all other sources of food.

The pandemic has focused concern yet again towards the practices that involve interaction between humans and both farmed and wild animals, dead and alive, which are considered to have been part of the origin of earlier virus outbreaks, including Ebola, SARS, MERS and Avian Influenza. That can include methods of animal husbandry and also the operation of wet markets, small and large. Disruptions in the food chain, such as the extensive damage to the pork value chain due to an unprecedented spread of African Swine Fever in China (Patton D, 2021<sup>[26]</sup>), may also contribute to the complexity of the issue insofar as alternative sources of protein may be sought. It could be argued that this is just in the nature of zoonotic disease, i.e. spillover of a virus across species, and that it is other factors such as concentration of population and ease of global transport that has transformed traditional practices into deadly pandemics. But these practices remain part of the issue and being traditional is not a compelling reason to let them



continue. This is what the multidisciplinary approach of One Health is designed to deal with. These issues are connected with the food production system even if they are not food-borne illnesses and therefore those involved in food safety, including the food industry, need to be active members of One Health and need to take responsibility for whatever their contribution to the interlocking issues may be. Zoonotic disease control is a genuinely complex issue and merely being a contributor to that complexity matters.

While some regulations including bio-security measures already exist for farmed animals, the issue of zoonotic disease and food safety can be presented as whether food safety regulation should try to regulate to prevent zoonotic diseases. Some of the complexities of this were covered when considering the various regulatory responses in Chinese cities to the outbreak attributed to the Wuhan market. But they are not an integral part of the Chinese food safety regulatory regime but rather the regulation of the trade in animals and so implementation is unlikely to be through the local government system for food safety (Xie E, 2020<sup>[27]</sup>). Regulation by the state is certainly an element in action to tackle the sort of issues covered by One Health but that needs to be divided across specific regulatory regimes. That will also bring with it considerations of the structure of governments since regulation will be the responsibility of particular ministries and this will vary from one country to another. A complex issue like managing the risk of further pandemics will have a regulatory element but it will involve a mixture of ministries and regulatory regimes, just as One Health is a multidisciplinary movement.

## Managing the problem of wet markets

Wet markets are another key element in the analysis of how the constant threat of zoonotic disease may result in pandemics. But these are themselves complex socio-economic problems and go beyond simple labelling as food safety. Although the centre of food safety is the issue of pathogens in otherwise safe food, much of the practice relates to human behaviours in managing the risks presented by these pathogens. The substance carrying the pathogen only becomes food when it enters the food chain. Food chains can become extremely complicated and lengthy, and they will often have bottlenecks, where the risk of mismanagement of the food increases. One of the main bottlenecks is markets. They are a pinch point where a host of risks intermix, from the number of people, business interests, animals, food products, pests and pathogens that interact in a confined space, with many hygiene challenges. For animals to enter the food chain, they have to be slaughtered and that can create another bottleneck. But some markets are also where animals are killed on the spot or slaughtered locally. “Wet” markets are where fresh meat, fish, living animals or other perishable goods are sold, in contrast to “dry” markets which sell textiles and hardware. Wet markets therefore present a major challenge to food safety.

However, there is no easy answer to the problem of wet markets. They can be regulated but that in itself does not solve the problem since implementation may be ineffective and wider socio-economic factors may further complicate the issues. In developing economies, many wet markets will also be in the informal sector, i.e. outside the operation of the regulatory system, but the weaknesses in regulatory implementation within the formal sector may make the difference between formal and informal less of an issue. What is more important than the regulatory issues are the socio-economic drivers. Wet markets are fundamental to the local economies and also to the social functioning of the local communities. The customers are often in the poorer segment of the market and that gives them specific demands, such as small portions of fresh food for immediate consumption. A study in Southern Africa showed that informal traders could buy food products from supermarkets and make a profit selling them in local markets because they had divided them into smaller portions which were more affordable, although more expensive by weight (Crush J and Frayne B, 2018<sup>[28]</sup>). This is one illustration of the debate over the last ten years in development economics (and food safety) around “supermarketisation”.

In summary, “supermarketisation” is a debate between the roles of government and of the private sector in driving development of food value chains, including production and also retail. The term comes from the advent of supermarkets as part of urbanisation, belonging to national or even global chains. These could be relatively small “convenience stores” or hypermarkets but would be driven by private sector. Some companies would also create or support much of the value chain from initial production through to distribution and retail by various methods, including creating their own farms. This activity by the private sector can significantly affect the agri-business sector and the distribution and retail sectors. The debate arises where that development replaces or delays deeper and wider development of these sectors by government action.

There are strong advocates of supermarkets driving development in Lower- and Middle-Income Countries (LMICs). Indeed, it remains a policy of the Vietnamese government in trying to modernise its agricultural, rural and urban economies (Wertheim-Heck, Vellema and Spaargaren, 2015<sup>[29]</sup>). Advocates argue that it leads to higher standards of food safety because it is backed by the global food companies rather than national governments. These companies can create their own supply chains in the country by working as vertical integrators, providing a reliable market for small producers which allows them to build stronger businesses. There is a wide variety of methods through which global food companies can create what can amount to a micro economy or even be regarded as a micro regulatory environment.<sup>9</sup> Some variations are:

- The company supplies piglets to householders, plus feed, and guarantees a purchase price on maturity: this can strengthen livestock breeding in terms of genetic stock and initial health of the piglet.
- The company provides smallholdings, including accommodation, plus all agricultural inputs and training, and markets the resulting products.
- The company enters into a contract with collectives which gives it shared rights to land for farming and it manages diversification across the collective, in addition to providing a guaranteed market for the produce.

One illustration of this comes from the Metro supermarket chain, operating through “Star Farm” networks in both China and Pakistan. A key element is providing a traceability system for the food products in its supermarkets.<sup>10</sup> Customers can use a smartphone app to scan a barcode to display the entire history of the product, which gives them some reassurance about the safety of the food.

Opponents argue that this leads to capture of the rural economy by the elite, while covering a small percentage of the overall rural economy and giving the government cover to delay or avoid wider development strategies (Jaffee et al., 2019<sup>[30]</sup>). Food safety standards will generally be higher in supermarkets than in informal markets but that is not always guaranteed, and even informal markets need to ensure a certain level of food safety – they cannot survive if they seriously poison their customers through poor food hygiene. It is also argued that the food is often more nutritious in informal markets than the ultra-processed food that is the staple in many supermarkets. But the arguments in favour of traditional wet markets are primarily socio-economic. One study of a wet market and slaughterhouse in Ibadan, Nigeria, noted that a modern market and slaughterhouse built to replace the unhygienic old market was rejected by traders, with some even being killed in rioting to stay where they were (Grace, Dipeolu and Alonso, 2019<sup>[31]</sup>). As explained in that article:

*“The case study also provides an example of how attempts to upgrade value chains can be problematic if they do not take into account the context and the complexities of governance. The modern abattoir had objectively better facilities, but the location was less convenient and the costs for the butchers higher. It was not apparent that any market survey had been carried out to establish demand. There are many other examples in developing countries where modernisation of infrastructure resulted in facilities that were less acceptable to traders and customers. For example, a well-documented case from Lusaka examined how street vendors were moved into new and hygienic premises. However, most returned to their former positions as the improved market was less accessible to customers and entailed more transaction costs for traders, even though the environmental conditions were better (Ndhlovu PK, 2011<sup>[32]</sup>)”.*

The International Livestock Research Institute (ILRI) is one of the leading supporters of informal wet markets, including the role of these markets in the recent growth of livestock as a food in LMICs.<sup>11</sup> The related International Food Policy Research Institute (IFPRI) has also published a defence of wet markets specifically in China (Alita L, 2020<sup>[33]</sup>) but it has also published a blog arguing against the “either/or” mindset in the supermarketisation debate (Ranieri J and Wertheim-Heck S, 2020<sup>[34]</sup>), with various suggestions for more varied policies to support the smaller businesses:

- Identifying innovative food safety policies and interventions, such as participatory guarantee systems, to improve wet market vendor hygiene and food handling practices.
- Implementing low-cost safety control mechanisms and policies to renovate and upgrade existing traditional fresh food outlets, improve business standards, and offer an alternative to closure.
- Removing supermarket access barriers for poorer consumers: in time, convenience, cost, and perceptions, without jeopardizing diet quality.
- Creating more effective in-store food quality control and consumer awareness campaigns to improve trust in food safety guarantees and education about diet and health risks associated with ultra-processed foods, and the importance of continuing to eat fresh produce.

What this illustrates is the importance of placing food safety regulation within a wider policy context than simply food hygiene. The supermarketisation debate is primarily related to LMICs whereas the role of supermarkets and indeed the global food companies is very different in developed economies (Shucksmith and Brown, 2016<sup>[35]</sup>). The approach to food safety in LMICs within a wider economic perspective has recently been usefully summarised in an article in *World Development* journal (Hoffmann, Moser and Saak, 2019<sup>[36]</sup>). The World Bank Group (Jaffee et al., 2019<sup>[30]</sup>) takes this further in positing a “food safety lifecycle” that developing economies go through as they transit from Low Income to Upper Middle Income. Designing food safety regulatory frameworks needs to be tailored to these contexts, rather than following one regulatory model or one economic model.

## Delivering food safety

Food safety is delivered by what people who manage food do with it. The levers that determine what they do with it include market forces, regulations, habits, information and awareness, social pressures and even just how they feel at the time. Regulations are only one of these levers, and not necessarily a strong one. The regulations may be specifically part of a food safety regulatory regime, but they may also act on other levers, especially on market forces, as seen in the previous discussion about wet markets, or on animal husbandry, as seen in the One Health discussion. But in each case the regulations are only a tool for government to try to influence behaviour, as opposed to a lever that has a direct (and intended) consequence. Good regulatory design matters but what matters equally is how regulations are implemented and scoring the right balance between market forces and regulations.

An important factor in food safety regulation is that it is usually accompanied by an implementation infrastructure, rather than just left on the books in the legislature or jumbled with numerous other regimes and given to local governments to manage somehow. There will often be an institution dedicated to delivering the regulatory outcomes, with research and analysis capabilities and direct or indirect access to a network of people on the ground to take action. Where such an institution is focused on the regulatory outcomes, rather than just the technicalities of specific regulations, it becomes an important actor in the complexity of delivering food safety. It is that actor who can connect through One Health with other agencies within the multidisciplinary approach to find collaborative solutions for its part in the complex challenge of managing zoonotic disease.

In general, the traditional approach to regulation was “command and control” or “enact and enforce”. It assumed that delivery of the regulatory outcomes depended on stopping bad things happening. Especially with food safety but also with other safety-based regulatory regimes, there is now a recognition that the regulatory outcomes require proactive, preventive, positive action. This is a new paradigm but now well established across developed economies. The force of law may be needed to make people do things against their will but delivering better ways of working and higher practice standards does not require enforcement. It requires new techniques from regulatory agencies, primarily in engaging with the regulated subjects and enabling them to improve. The paradigm shift is from “enact and enforce” to “engage and enable”.

One food safety regulator serves as a relevant example about how delivery of regulatory objectives has transformed to become more engaging and enabling. The Food Safety and Standards Authority for India (FSSAI) has taken a radical approach to its delivery role. Its remit under the Food Standards and Safety Act 2006, Section 18, is – “to ensure safe and wholesome food for human consumption”. The addition of “wholesome” allowed it to cover both safety and nutrition but it then went a stage further and built on its powers in relation to packaging to claim authority to implement some environmental element of a food systems approach. The result is a programme called “Eat Right India” which promotes the following philosophy (FSSAI, 2021<sup>[37]</sup>): “If it’s not safe, it’s not food; If it’s not healthy, it’s not food; and if it’s not good for the planet, it’s not food.”

It sees its remit as widely as that, but its exercise of that remit is also radical. It has a graded approach to delivering its objectives.

- **For large food businesses:** FSSAI uses traditional regulatory instruments and tools with a focus on schemes of testing and inspections. Its banning of Maggi Noodles in 2015 demonstrated that it was also a robust enforcer where appropriate (Chhabara Rajesh, 2015<sup>[38]</sup>).
- **For small and medium food businesses:** The focus is largely on capacity building and hygiene ratings to promote self-compliance. The purpose is to improve hygiene conditions especially at the manufacturer’s level. Under the authority’s hygiene rating initiative, food businesses are given a rating (five to one) to reflect the level of hygiene and food safety compliance, based on the English Food Hygiene Rating System.
- **For micro and informal businesses:** it applies a “cluster approach” – a systematic process of gap analysis, filling infrastructure gaps, training and capacity building and certification. It works with clusters of hawkers, up to one street at a time, rather than individuals. They have to register with FSSAI but this does not in itself take them into the formal sector as individual businesses.

There is much to learn from the FSSAI approach to delivering food safety. A conventional inspection-based approach would not go far in tackling the scale of the problem. It is trying to ensure the supply of safe and wholesome food to 1.3 billion people daily, equivalent to 16.66% of the entire world population. It sees its main task as raising practice standards rather than sanctioning non-compliance. Closing down a bad business does not create a good business and India needs millions of good businesses in order to meet the objective. Urbanisation is putting even more stress on street food and it is resisting supermarketisation, which means that FSSAI has to deal with millions of micro businesses in the informal sector. Rather than “enforce”, its mantra is “engage, excite, enable”. So, it promotes campaigns that provide information and motivation to improve food hygiene. It partners with many other bodies and builds new networks in order to expand its reach. It has produced more YouTube videos than secondary regulations.

This approach not only fits with the expansive view of food safety as a topic but also aligns with thinking on how to deliver real progress in managing food. There is a common saying in the development profession that “you can’t regulate your way to food safety”, mainly because the majority of transactions in LMICs are in the informal sector which is, by definition, unregulated. Instead, the focus is on an approach referred to as TCM – Training, Certification and Marketing (Grace, Dipeolu and Alonso, 2019<sup>[31]</sup>). Training is essential if standards are to rise but it is insufficient. Something more has to result from it, which is often some form

of certification or recognition that the business has improved (which can fit with the hygiene rating schemes). It also needs motivation because commercial pressures will not always align with improved standards.

One useful example from the Eat Right India range of interventions and campaigns is Clean Street Food Hub. This aims to improve standards in street food and applies the FSSAI approach. Groups of traders for an area are registered and trained but they are also enabled. The local government provides clean water, electricity and waste disposal services for the traders, without which the training would achieve little. FSSAI is now working with local governments across India to provide that infrastructure as part of urban planning, rather than as a one-off. It is funding 500 Clean Street Food Hubs but challenging the State authorities to expand that to 15 000 (FSSAI, 2021<sup>[39]</sup>). The approach also meets the TCM model.

It was not the first to recognise that engagement with the regulated businesses had to be effective and not formal. In 2007, the United Kingdom Food Standards Agency (FSA) faced the challenge of new EU regulations that required even small food businesses to apply Hazard Analysis Critical Control Point (HACCP) principles, a method of managing food safety (and other) risks but it can be very challenging and expensive to implement in full. It produced a pack for small family-run restaurants called “Safe Food, Better Business” which consisted of a lever-arch folder with wipe-clean sheets of instructions on basic operations in a small restaurant, using pictures and diagrams with minimal text. It also had a DVD in 14 languages, to cover some of London’s diversity of national cuisines. It was a seminal approach that has been followed or imitated in many countries, with even a Mongolian edition released in 2016. A study by the Chartered Institute of Environmental Health<sup>12</sup> also showed that 68% of the businesses who used it also improved their commercial business by applying a more systematic approach to management of food products, and thus reducing waste etc.

This latter point is also an important insight to the new approach to regulatory delivery – not that regulatory intervention should always improve business but that improving business was a relevant consideration. A very common approach to implementing food safety regulation has been the use of an official inspection result as a marketing point to attract consumers. It started first in San Francisco late last century but can be found in many countries across the globe, including Nepal. It is interesting that this technique is almost exclusive to food safety regulation and has not been successfully applied in other regimes.

## Conclusions

Delivering the objectives of a regulatory regime for food safety does not depend on a relationship with business based on sanctions. Regulation may be needed to empower or enable, and it is also important in shaping what good looks like, through reference to standards. But to be effective it needs a delivery agency to provide organisation, focus and also a contact point for other bodies with related objectives. A modern regulatory delivery agency has to work beyond just assuring compliance with technical requirements. It needs to understand the sector it is regulating and be aware of what changes the sector may need that come from other parts of government<sup>13</sup> as well as modifications needed in its own regime. The relationship with the businesses in the sector has to be one of engagement rather than top-down supervision (while avoiding “regulatory capture”). This can be seen in the way that guidance in relation to new regulations has moved from lengthy texts that largely repeat the regulations to infographics, videos and social media. Most modern regulatory delivery agencies will have a well maintained Facebook page. The application of the new discipline of behavioural insights also illustrates how far “enforce” has become “engage”.

That sort of delivery agency is a way for government to overcome the constraints of organisational silos, by having teams that can collaborate with other parts of government and external partners through the various multidisciplinary networks that have been referred to earlier. Food safety regulation and food safety agencies do not have to regulate trade in animals in order to be an active part of the One Health network

along with the specialists who are better placed to guard against further pandemics arising from another zoonotic spillover. The importance of policy coherence across related areas of regulation has been stressed in the OECD Recommendation on Policy Coherence for Sustainable Development (PCSD) (OECD, 2019<sup>[40]</sup>) and is actively pursued by OECD.

But perhaps the biggest change in the delivery of safer food is the recognition that techniques for engagement and enabling can transcend the regulatory regime. They can be applied in informal markets and not just to registered businesses. FSSAI cannot make much headway in the scale of its challenge without finding a way to improve practice levels in the informal economy. When looking at ways of preventing future pandemics by changing behaviours, that will have to include changing behaviours in the informal economy as well.

## Notes

<sup>1</sup> SDG 7 deals with affordable and clean energy. SDG 13 and 14 deal with climate action and life below water respectively.

<sup>2</sup> For a short summary of the “supermarketisation” debate, see <https://www.ifpri.org/blog/supermarketization-food-environments-and-urban-poor>.

<sup>3</sup> Overview of most widespread zoonoses, <https://absa.org/wp-content/uploads/2017/01/zoonoticfactsheet.pdf>.

<sup>4</sup> For an explanation of what constitutes food-borne illness, see [http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253a%252f%252fworkspace.fao.org%252fsites%252fcodex%252fmeetings%252fcx-712-51%252fcrd%252ffh51\\_crd06x.pdf](http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253a%252f%252fworkspace.fao.org%252fsites%252fcodex%252fmeetings%252fcx-712-51%252fcrd%252ffh51_crd06x.pdf).

<sup>5</sup> See a CDC infographic on transmission of avian flu, <https://www.cdc.gov/flu/pdf/avianflu/avian-flu-transmission.pdf>.

<sup>6</sup> This New York Times article illustrates this quandary since the subject has been farming bamboo rats for five years so may have progressed from simply containment and breeding to a form of quality control if it is a sustainable food business, <https://www.nytimes.com/2020/06/07/world/asia/china-coronavirus-wildlife-ban.html>.

<sup>7</sup> This South China Morning Post article summarises a range of regulatory responses, <https://www.scmp.com/news/china/society/article/3085467/coronavirus-wuhan-confirms-chinas-ban-trade-eating-wild-animals>.

<sup>8</sup> This is also the case for bacterial infections. Most food-borne pathogens are bacterial in origin. Antibiotic resistance is increasingly becoming a cause of international concern. Some countries such as

Sweden in their strategy to combat antibiotic resistance are setting an example for policy coherence. <https://www.government.se/articles/2020/04/updated-swedish-strategy-to-combat-antibiotic-resistance/>.

<sup>9</sup> For an insight into the world of “contract farming”, see the FAO / Unidroit / IFAD “legal Guide to Contract Farming” Rome 2015, <https://www.unidroit.org/studies/contract-farming>.

<sup>10</sup> <https://www.metro.cn/en/metro-food-safety/traceability>.

<sup>11</sup> See this blog: <https://news.ilri.org/2015/01/27/despite-contamination-concerns-africa-must-embrace-wet-markets-as-key-to-food-security/> from 2015, which ILRI has put back on its landing page in 2020, and the book that it is based on: <https://cgspace.cgiar.org/bitstream/handle/10568/42438/Food%20Safety%20and%20Informal%20Markets.pdf?sequence=4&isAllowed=y>.

<sup>12</sup> Available at : [https://web.archive.org/web/20071020072540/http://www.cieh.org/library/Knowledge/Food\\_safety\\_and\\_hygiene/Case\\_studies/Westminster%20CHIP.pdf](https://web.archive.org/web/20071020072540/http://www.cieh.org/library/Knowledge/Food_safety_and_hygiene/Case_studies/Westminster%20CHIP.pdf).

<sup>13</sup> This is similar to the “Regulatory Stewardship” model that has applied in New Zealand since 2013, <https://www.treasury.govt.nz/information-and-services/regulation/regulatory-stewardship>.

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