Health & Global Food Systems: An Investor's Guide

June 2025

First Sentier MUFG
Sustainable Investment Institute

Contents

About the institute and its sponsors and partners

About the institute

The First Sentier MUFG Sustainable Investment Institute (the Institute) provides research on topics that can advance sustainable investing. As investors, both First Sentier Investors and MUFG recognise our collective responsibility to society and that investment decisions should be made with consideration to our communities both now and in the future.

The Institute commissions research on Environmental, Societal and Governance issues, looking in detail at a specific topic from different viewpoints. The Institute recognises that investors are now looking in far greater depth, and with far greater focus, at issues relating to sustainability and sustainable investing. These issues are often complex and require deep analysis to break down the contributing factors. If as investors we can better understand these factors, we will be better placed to consider our investment decisions and use our influence to drive positive change for the benefit of the environment and society.

The Institute is jointly supported by First Sentier Investors (FSI) and Mitsubishi UFJ Trust and Banking Corporation, a consolidated subsidiary of MUFG. Representatives of both organisations will provide input to the activities of the Institute.

An Academic Advisory Board advises the Institute on sustainability and sustainable investment research initiatives. The Academic Advisory Board comprises prominent leaders from academia, industry and nongovernmental organisations in the fields of Responsible Investment, climate science and related ESG endeavours. The Board provides independent oversight to ensure that research output meets the highest standards of academic rigour.

Institute@firstsentier.com
www.firstsentier-mufg-sustainability.com
www.mufg-firstsentier-sustainability.jp

The Institute's Sponsors and Partners

About First Sentier Investors

First Sentier Investors

First Sentier Investors (formerly First State Investments) is a global asset management group focused on providing high quality, long-term investment capabilities to clients. We bring together independent teams of active, specialist investors who share a common commitment to responsible investment and stewardship principles. These principles are integral to our overall business management and the culture of the firm.

All our investment teams – whether in-house or individually branded – operate with discrete investment autonomy, according to their investment philosophies.

https://www.firstsentierinvestors.com

About MUFG

Mitsubishi UFJ Financial Group, Inc. (MUFG) is one of the world's leading financial groups. Headquartered in Tokyo and with over 360 years of history, MUFG has a global network with approximately 2,000 locations in more than 40 countries. The Group has about 140,000 employees and offers services including commercial banking, trust banking, securities, credit cards, consumer finance, asset management, and leasing. The Group aims to "be the world's most trusted financial group" through close collaboration among our operating companies and flexibly respond to all of the financial needs of our customers, serving society, and fostering shared and sustainable growth for a better world. MUFG's shares trade on the Tokyo, Nagoya, and New York stock exchanges. For more information, visit

https://www.mufg.jp/english.

About the Trust Bank

Mitsubishi UFJ Trust and Banking Corporation, as a core member of MUFG, provides its customers with a wide range of comprehensive financial solutions leveraging unique and highly professional functions as a leading trust bank. Such financial solutions include real estate, stock transfer agency, asset management and investor services, and inheritance related services, in addition to banking operations. The Trust Bank aims to realize its vision to be the trust bank that can create a safe and enriching society and future alongside customers through trust; as such, its key concept is "Create a Better Tomorrow". For more information, visit

https://www.tr.mufg.jp/english

About Planet Tracker

Planet Tracker is an award-winning non-profit financial think tank aligning capital markets with planetary boundaries. Created with the vision of a financial system that is fully aligned with a net-zero, resilient, nature positive and just economy well before 2050, Planet Tracker generates break-through analytics that reveal both the role of capital markets in the degradation of our ecosystem and show the opportunities of transitioning to a zero-carbon, nature positive economy.

https:// www.planet-tracker.org

Executive summary

The global food sector profoundly impacts human health, with obesity, malnutrition, food insecurity and antimicrobial resistance from animal farming posing critical challenges. In 2020, 42% of the global population was classified as overweight or obese, with projections indicating a rise to 54% by 2035[1] (Figure 3). The consumption of ultra-processed foods, which make up over 50% of total caloric intake in some high-income nations, has exacerbated diet-related health issues, including diabetes and cardiovascular diseases.[2]

Figure 1: Global Trends in Adult Overweight and Obesity (2020-2035). (Source: World Obesity Federation, 2024)[1]

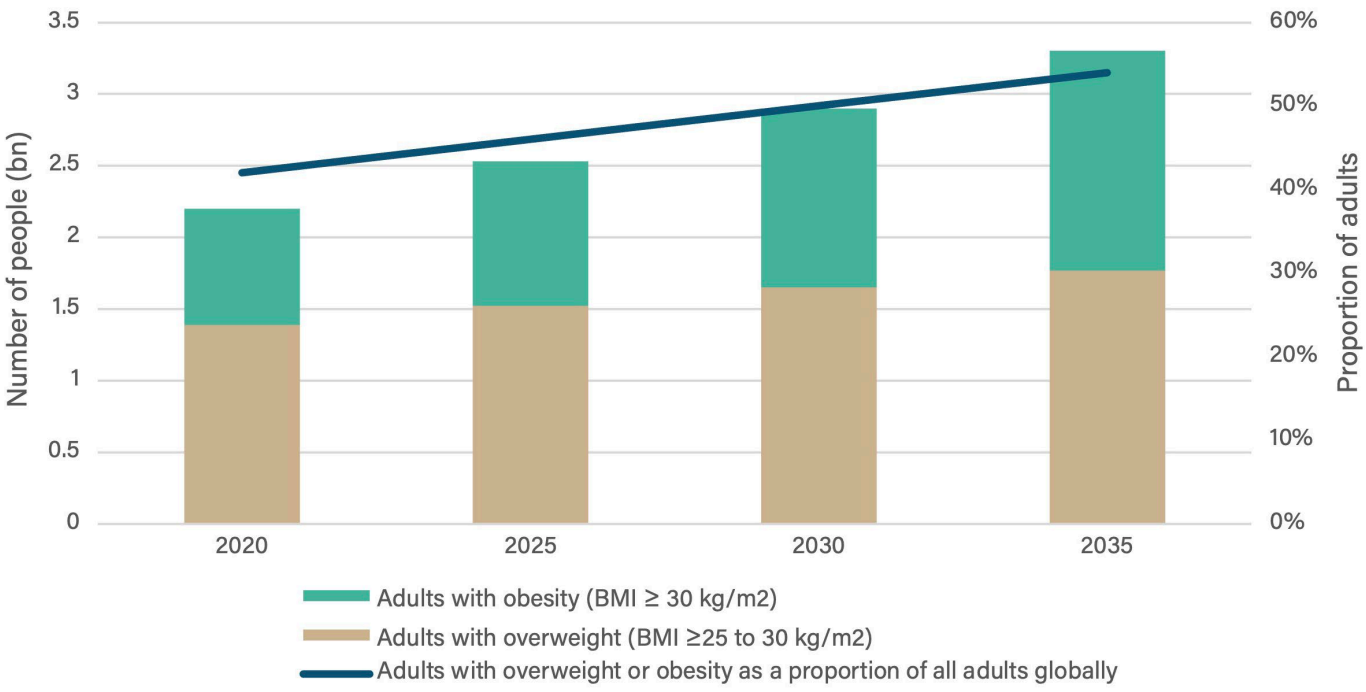
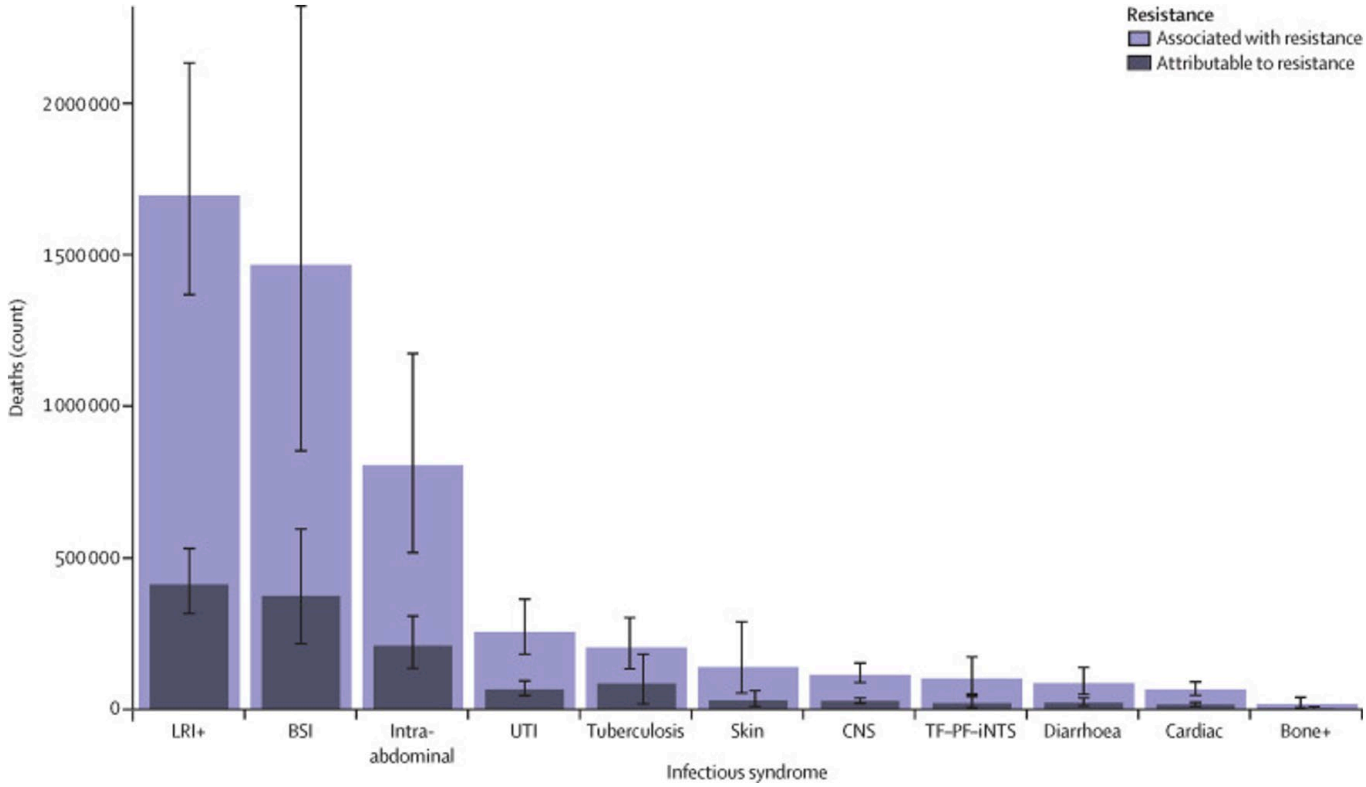


Figure 2: Deaths attributed to Antimicrobial Resistance. (Source: Murray, C. J. L., et al., 2022) 3)[3]



Additionally, the misuse of antibiotics in livestock and aquaculture is accelerating antimicrobial resistance, a growing crisis responsible for 1.27 million human deaths annually (Figure 2).

If left unchecked, antimicrobial resistance-related fatalities could double by 2050, with significant economic consequences. This report explores these challenges, their financial implications, and the regulatory developments addressing them.[3]

The intersection of the food sector and public health has major financial repercussions. Rising obesity rates and antimicrobial resistance are increasing healthcare costs, productivity losses, and regulatory pressures, leading to significant risks for investors. Governments are increasingly implementing policies, including sugar taxes, marketing restrictions and limits on the inappropriate use of antibiotics, directly affecting corporate revenue streams. Consumer preferences are also shifting toward healthier and more transparent food choices, creating competitive advantages for companies that adapt. Investors must assess company strategies for mitigating health risks, ensuring regulatory compliance, and capitalising on changing consumer behaviours to build sustainable, long-term investment portfolios.

Obesity is a leading contributor to non-communicable diseases, responsible for an estimated 42 million deaths annually.[4] Ultra-processed foods, rich in sugars, salts, and unhealthy fats, are the primary drivers of this trend. The economic burden of obesity is substantial, costing OECD countries 3.3% of GDP.[5] Without intervention, global healthcare costs related to obesity could surpass $18 trillion by 2060. Childhood obesity is particularly concerning, with rates doubling over the last five decades. Similarly, antimicrobial resistance threatens public health and global economies, with projections indicating a 3.8% reduction in GDP by 2050 due to its impact on healthcare systems, agricultural productivity, and labour markets.

The dominance of ultra-processed foods in global diets contributes to poor health outcomes, particularly among low-income and marginalised communities. Food marketing strategies exacerbate these health risks, especially among children and communities of colour. Companies target vulnerable populations through television, digital advertising, and celebrity endorsements, normalising unhealthy consumption patterns. In 2019, U.S. fast-food advertising spending exceeded $5 billion, with the majority directed toward products high in fat, sugar, and salt.[6] The disproportionate marketing of unhealthy foods to marginalised communities exacerbates existing health disparities, contributing to higher rates of obesity, diabetes, and cardiovascular disease.

Governments worldwide are implementing policies to mitigate the health risks associated with unhealthy diets and antibiotic misuse in agriculture. Sugar taxes, front-of-package labelling, and restrictions on unhealthy food marketing are gaining traction, with over 100 countries implementing sugar-sweetened beverage taxes and nearly 70 countries adopting front-of-package labelling systems. Mandatory food composition policies, including reformulation targets for salt, sugar, and trans fats, are becoming more prevalent. Meanwhile, regulations on antibiotic use in livestock, such as the EU's ban on antibiotic growth promoters, are setting industry precedents. Companies that fail to adapt face financial penalties, export restrictions, and reputational damage, while those embracing reformulation and transparency stand to gain market share.

Investors play a pivotal role in shaping a healthier and more sustainable food system.

Supporting companies to proactively address health risks can mitigate financial exposure and drive long-term value.

Key considerations include:

- **Corporate strategies for reducing ultra-processed food dependence.**
- **Compliance with emerging regulations.**
- **Efforts to curb antibiotic misuse in food production.**

This report provides a framework for assessing food sector risks and opportunities, empowering investors to make informed decisions that align with evolving market and regulatory landscapes. In addition to risk assessment, the report offers investor engagement guidance on key health-related issues in the food sector, equipping investors with targeted questions to drive meaningful corporate action across six key themes:

Key themes	Description
Pricing and affordability	Examines whether companies are making healthier foods more accessible and affordable, particularly for low-income consumers. Focuses on how pricing strategies support equitable access to better nutrition.
Sales and targets	Assesses whether companies set and report on measurable targets to increase the sales of healthier products, promoting transparency and accountability in their health and nutrition commitments.
Marketing and advertising	Explores how companies influence consumer behaviour through advertising, particularly whether they prioritize healthy foods and limit unhealthy food marketing, especially to children.
Product reformulation and innovation	Looks at how companies improve the nutritional profile of their products through reformulation and innovation, ensuring that healthier options are embedded across product lines.
Governance and strategy	Evaluates whether nutrition and health are embedded into corporate strategy and governance structures, reflecting leadership commitment to public health and long-term business sustainability.
Risk management	Focuses on how companies identify, assess, and manage risks related to health, particularly in connection with ultra-processed foods, shifting consumer preferences, and evolving regulations.

Addressing these challenges will not only benefit financial portfolios but also contribute to improved public health outcomes and economic stability.

Why this matters for investors

The food sector's role in public health is increasingly influencing financial markets, with major implications for corporate profitability, economic stability, and long-term investment sustainability. Investors must consider the systemic risks associated with obesity, malnutrition, and antimicrobial resistance, as these challenges translate into mounting healthcare costs, productivity losses, and regulatory pressures on businesses.

Governments worldwide are introducing stringent food policies, such as sugar taxes, front-of-package labelling, and restrictions on unhealthy food marketing, which directly impact corporate revenue streams and necessitate strategic adaptation. Companies that fail to reformulate their products or adjust their business models accordingly may suffer from declining consumer demand and reputational damage, while those that proactively address these issues stand to gain market share in an evolving marketplace.

For investors, assessing how well companies manage these risks and opportunities is essential. By considering factors such as pricing strategies, product composition, regulatory compliance, and reputational risks, investors can make informed decisions that align with sustainable, long-term value creation. Understanding the interplay between food sector practices and health outcomes is crucial to mitigating risk and ensuring resilient investment strategies in a rapidly changing global landscape.

A call to action for investors

Investors play a crucial role in driving change within the food sector by prioritizing health-conscious and sustainability-focused companies. Key actions for investors include:

- **Encouraging companies to reduce their reliance on ultra-processed foods and curb the misuse of antibiotics in food production, helping investors to mitigate financial risks while contributing to improved public health outcomes.**
- **Engaging with food companies to set measurable targets for product reformulation, enhance the affordability of healthier options, and eliminate the routine use of medically important antibiotics in livestock and aquaculture.**

By supporting companies that proactively address these risks through responsible marketing, transparent antibiotic stewardship, and compliance with evolving regulations, investors can make informed decisions that align with long-term value creation while fostering a healthier, more sustainable food system.

Introduction

The global food sector has had a profound impact on human health, with rising obesity rates, malnutrition, and food insecurity posing urgent challenges worldwide. Food related diseases such as diabetes, coronary heart disease, and stroke are among the leading causes of mortality. Additionally, the shift towards ultra-processed foods—comprising over 50% of total caloric intake in some high-income countries—has exacerbated these health issues by displacing essential nutrients from diets.[2]

Beyond diet-related concerns, the misuse of antibiotics in livestock and aquaculture has accelerated the rise of antimicrobial resistance, a crisis responsible for 1.27 million deaths per year. If left unchecked, antimicrobial resistance-related deaths are expected to double by 2050, with severe consequences for both human health and global economic stability.[3] The economic burden associated with obesity and antimicrobial resistance is staggering, with estimates indicating that by 2060, global healthcare costs for obesity alone could surpass $18 trillion,[2, 3] while antimicrobial resistance could lead to a GDP reduction of up to 3.8% worldwide.

This report provides a comprehensive analysis of these health risks, examining how food companies contribute to and are affected by these challenges. It evaluates the economic implications of poor dietary trends and antimicrobial resistance, assesses regulatory developments aimed at mitigating these threats, and explores consumer shifts toward healthier products. The findings offer critical insights for investors evaluating food sector risks and opportunities.

How is the global food sector impacting human health?

The global food system is having a significant impact on human health across the world. Changes in diets are causing rising levels of obesity, malnutrition, and food insecurity. At the same time, the inappropriate use of antibiotics in livestock and aquaculture production is causing a rise in antimicrobial resistance in animals and humans.

This section will discuss the current status and future trends in diet- and antimicrobial resistance-related health issues across the world, along with the associated economic impacts.

Health & obesity

Obesity and malnutrition

Obesity is a growing global health issue, with 42% of the world's population categorised as overweight or obese in 2020.[1] Obesity is a condition of 'abnormal or excessive fat accumulation that may impair health', defined by the World Health Organisation[7] (WHO) as a body mass index (BMI) in adults greater than 30 kg/m^2, with overweight defined as a BMI in adults greater than 25 kg/m^2.

Obesity is part of the double burden of malnutrition:

1. **Undernutrition: A deficiency of nutrients, often caused by an inadequate diet. Undernutrition can cause visible wasting of fat and muscle, but it can also be invisible i.e. a person can be overweight/ obese and undernourished.**
2. **Overnutrition: Caused by an overconsumption of protein, carbohydrate and/or fat calories, which is stored as fat cells, causing overweight and obesity.**

A major cause of malnutrition is a poor diet, that is low in micronutrients (vitamins and minerals), which are essential for proper growth and development, and the lack thereof poses a major threat to health and development, particularly for children.[8]

The global transition to a 'Western diet' high in sugar, salt and fat[9] as well as increasing consumption of ultra-processed foods[10] are key drivers of this trend.

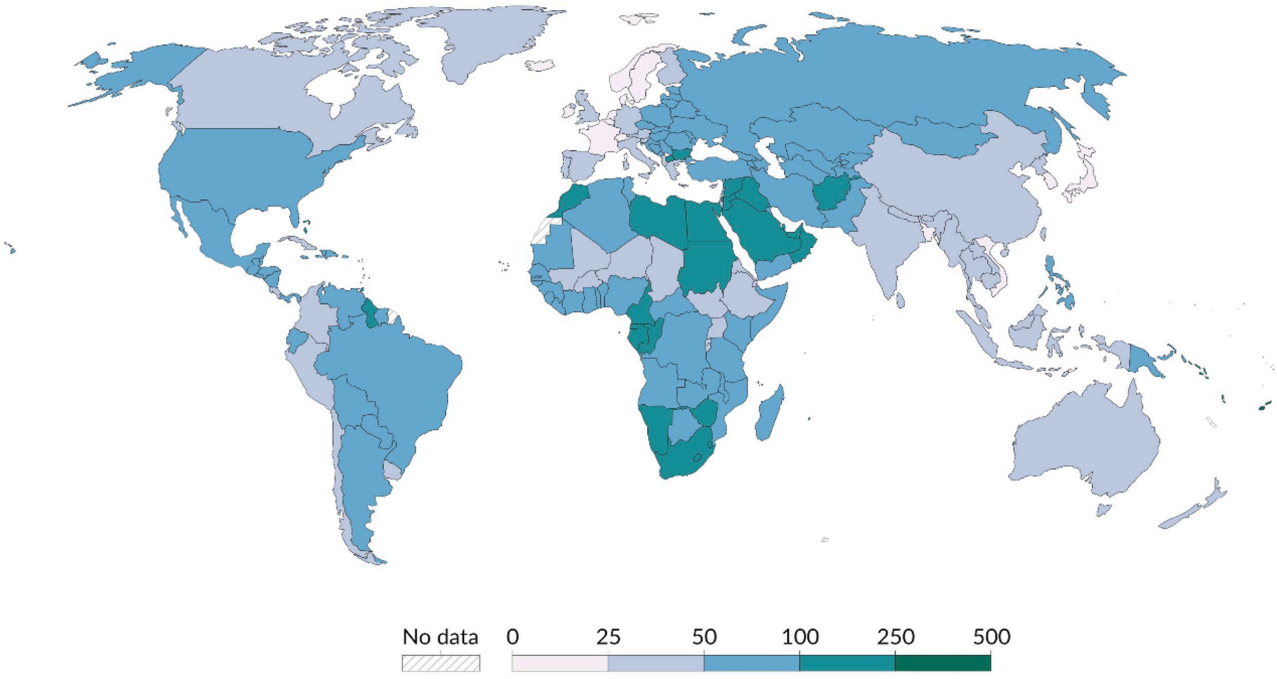
Obesity-related health risks

Obesity is a risk factor for several of the world's leading causes of death, including heart disease, stroke, diabetes, and various types of cancer.[11] Obesity and malnutrition can also significantly impact people's quality of life,[12] causing issues such as fatigue, poor quality sleep, mobility issues, low self-esteem and impaired psychosocial functionality.[13]

Estimates of the impact of obesity vary widely across sources. Lower estimates, for example from the WHO, suggest that obesity and overweight have reached epidemic proportions worldwide, and are responsible for the deaths of at least 2.8 million people annually.[14] Higher estimates suggest deaths attributable to diet-related risk factors, including high blood pressure, high blood glucose levels and overweight and obesity, among others, account for 19% (~11.8 million people[a]) of all global mortality.[15]

According to the 2024 Global Burden of Disease study,[4] recent estimates indicate that over 56 million people (adults and children) die each year, and 2.5 billion years of healthy life are lost to disease, injuries or other causes of ill health. Of these, some 42 million deaths and 1.6 billion disability-adjusted life years[b] are caused by non-communicable diseases. Two-thirds of these non-communicable disease deaths and 40% of the non-communicable disease disability-adjusted life years are caused by just four conditions: cancers (neoplasms), coronary heart disease, stroke and diabetes. Each of these is associated with and accelerated by overweight and obesity.[4]

Figure 3: The death rate from obesity, 2021 – Estimated annual number of deaths attributed to obesity per 100,000 people. (Source: IHME, Global Burden of Disease)[4]



a Planet Tracker Analysis. Using global death rate; 2024 (Our World in Data).

b Disability adjusted life years are calculated by adding together the years of life lost due to premature mortality and the years of healthy life lost due to disability.

Current obesity trends

If current trends continue, the proportion of adults living with overweight or obesity is projected to increase from 42% (2.2 billion) of the global population in 2020 to 54% (3.3 billion) by 2035. Similarly, for children aged 5 to 19 prevalence of overweight and obesity is expected to rise from 22% (430 million) in 2020 to 39% (770 million) by 2035.[16]

Historically, higher-income countries, particularly in regions like Europe, and North America, have experienced higher rates of overweight and obesity. In contrast, typically lower-income regions such as South-East Asia and Sub-Saharan Africa have had significantly lower prevalence rates.

However, over the past few decades, these regions have seen a notable rise in overweight and obesity,

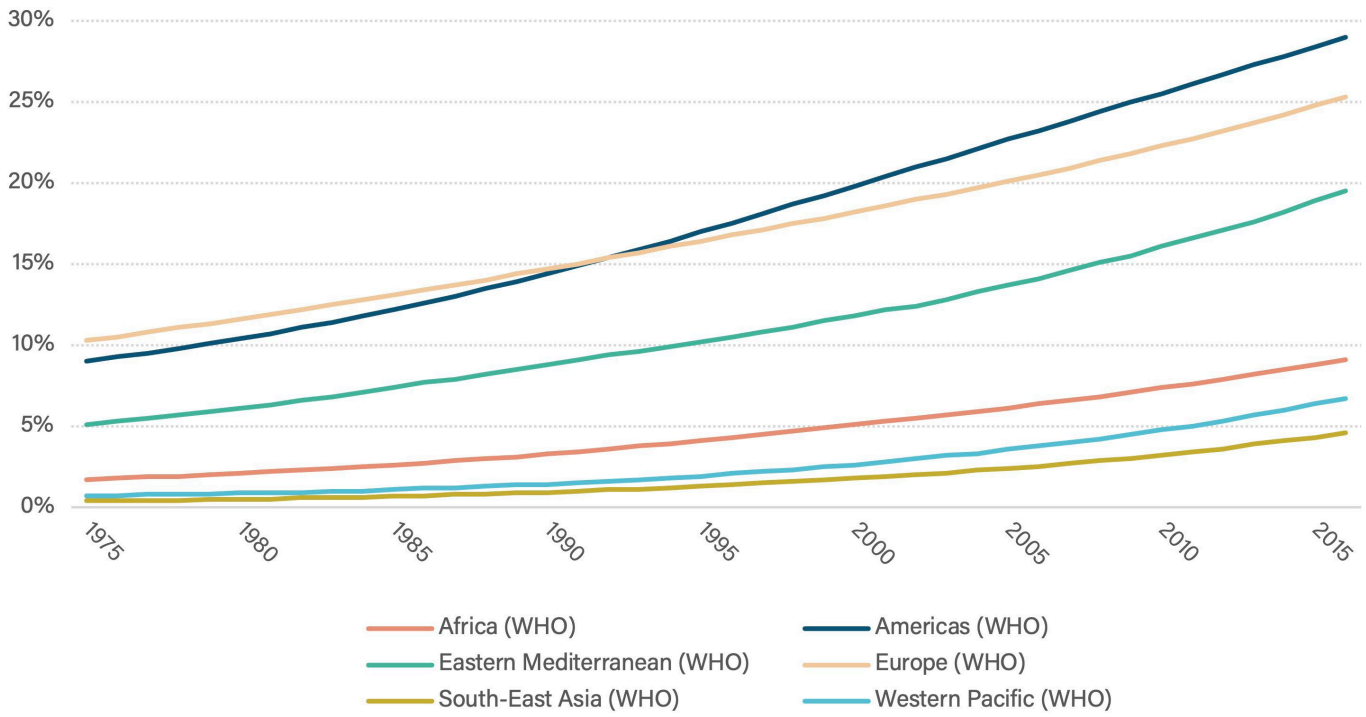
as shown in Figure 4 - highlighting a growing global health concern.

These trends have been driven in part by an increased consumption of processed food due to the growth of the manufactured food industry.[17] Per calorie, processed foods are less costly than non-processed foods, and increased affluence could also be associated with changing patterns in food consumption.[18]

People living in poverty lack access to healthcare, leading to worse health outcomes for those who are overweight or obese and because they often access healthcare services later, this ultimately puts more pressure on public health services.[19]

While the general global trend points to rising obesity rates, it is important to note that some jurisdictions face the opposite challenge. In Japan, for example, certain segments of the population—particularly younger women—are increasingly underweight, raising concerns among health authorities. This phenomenon has been linked to social pressures and shifting dietary habits, prompting initiatives aimed at addressing the risks associated with undernutrition.[20]

Figure 4: Obesity in Adults between 1975 and 2016 (Source: FAO, 2024). [21]



Rise in childhood obesity

Childhood obesity and malnutrition is an increasing global concern, due to adverse effects on children's physical, social and emotional wellbeing. It increases the risk of diet-related noncommunicable diseases in childhood and the physical and metabolic changes childhood obesity brings can carry into adult life, increasing the risk of non-communicable diseases later in life.[22]

Childhood obesity is an escalating global concern, with alarming statistics underscoring its rapid growth. According to UNICEF, around 30 million children under the age of five were living with overweight or obesity in 2000. By 2023, this number had risen to 37 million, marking a significant upward trend in early childhood obesity.[23]

Obesity is impacting older children and adolescents at even higher rates. In 2020, over 435 million children and adolescents aged 5-19 years were overweight or obese,[24] a dramatic increase from the 224 million estimated in 1975.[25] This represents a staggering rise of approximately 94.2% in less than five decades.

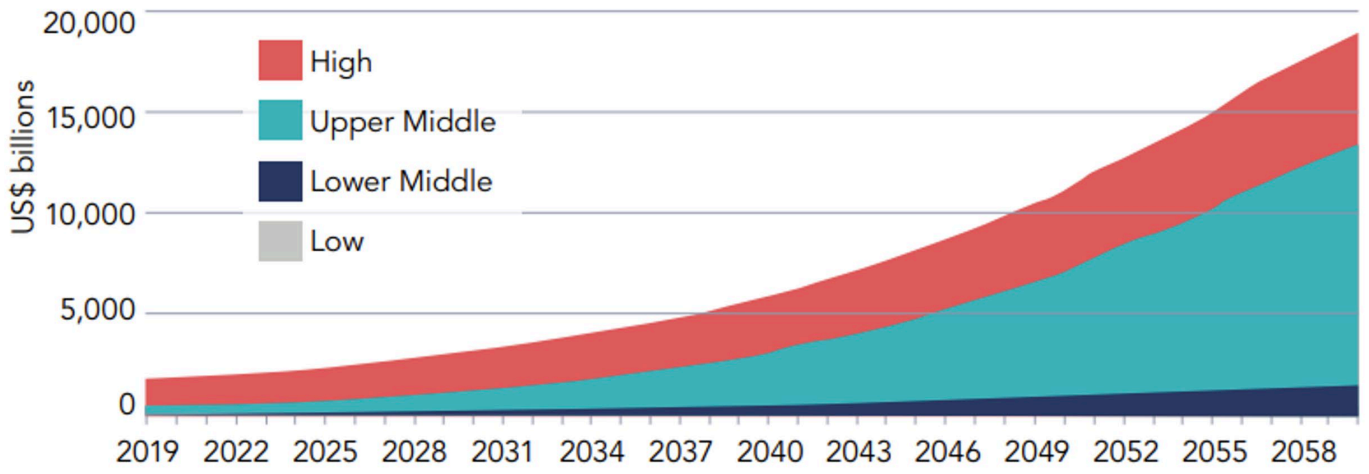
If no significant interventions are implemented, by 2035, obesity-related non-communicable diseases among children and adolescents will soar with estimates suggesting that in 2035, assuming no interventions to reduce overweight and obesity, approximately 171 million children will experience non-communicable disease risks, attributable to their high BMI. Most of which will not be detected or treated.[16]

Economic impact of obesity and malnutrition

Obesity is not just a public health crisis but also a significant economic burden for countries, impacting productivity and leading to high levels of health and social care expenditure. In OECD countries alone, obesity is estimated to cost 3.3% of GDP, underlining its significant negative impact on national economies.[5]

If current trends continue, the global economic burden of overweight and obesity is anticipated to surge from under $2 trillion in 2020 to over $3 trillion by 2030, and an alarming $18 trillion by 2060 (Figure 5).[26]

Figure 5: Estimated economic costs in 2020 to 2060 in country income group (Source: The World Bank).[c]



c US$ billions at 2019 prices. Income groups defined by World Bank.

A significant portion of the economic burden stems from the strain obesity places on national healthcare systems. Chronic diseases closely linked to high BMI—such as diabetes, cardiovascular diseases, and certain cancers—require extensive and costly treatments. Across OECD, G20, and EU28 countries, approximately $425 billion is spent annually on addressing obesity-related healthcare needs.[5]

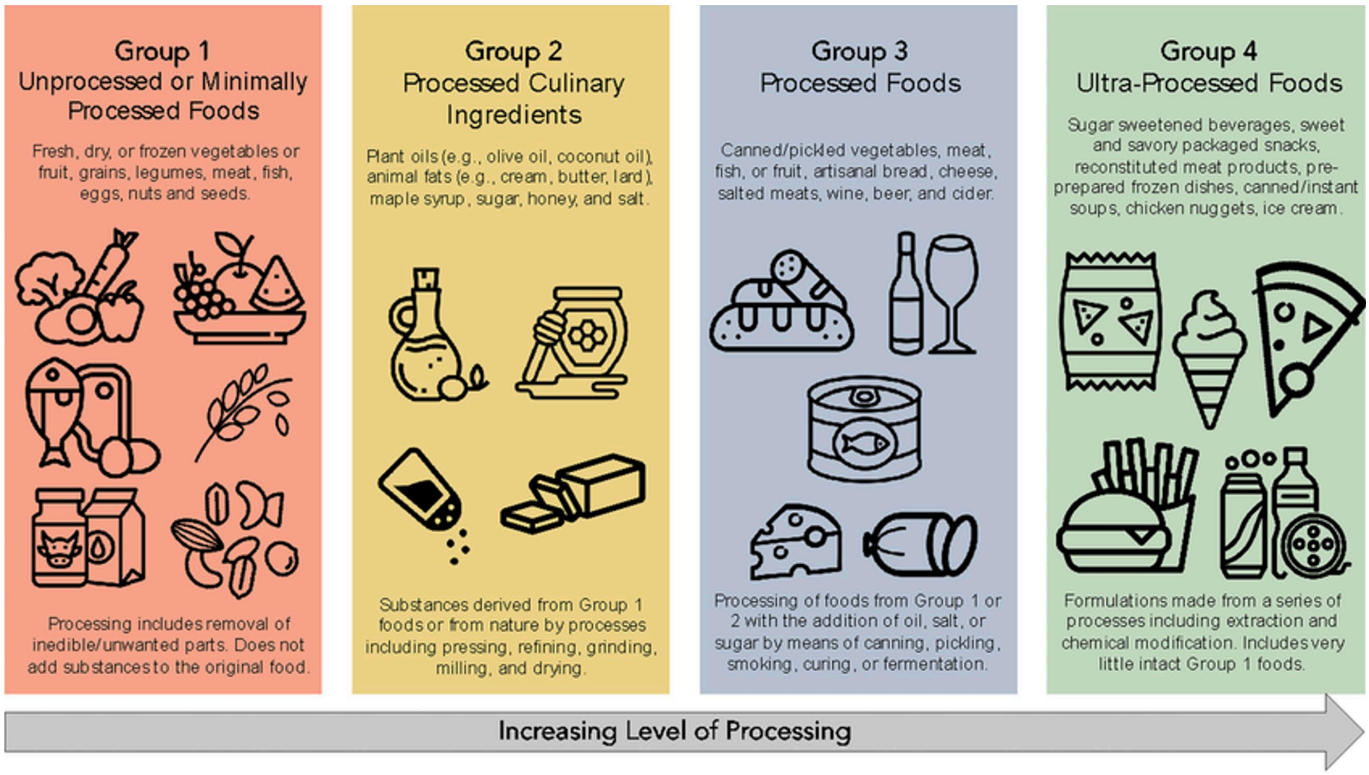
Beyond healthcare expenses, obesity undermines economic productivity. Individuals with chronic diseases are 8% less likely to be employed in the subsequent year and, if employed, often experience reduced productivity and higher absenteeism rates. The impact extends to children, as overweight youth are more likely to perform poorly in school and face diminished educational attainment.[5]

The cumulative effects of these factors significantly depress social wellbeing and national economies, with the total economic burden of overweight and obesity estimated to range from 1.6% to 5.3% of GDP, depending on the country.[d 5]

> *The combination of rising healthcare costs, reduced labour productivity, and lower educational outcomes paints a bleak picture of the potential long-term socioeconomic impact of obesity.*[5]

d Dependent on the country.

Figure 6: Spectrum of processing of foods based on the NOVA classification.[27]



Ultra-processed foods, and how they are impacting human health

The rising prevalence of obesity globally is closely linked to dietary patterns dominated by ultra-processed foods. There is a range of definitions for ultra-processed foods, however, the most recognised is the NOVA Food Classification system – a framework that groups foods according to the extent and purpose of the processing that they undergo – as shown in Figure 6 . It classifies ultra-processed foods as industrial products primarily composed of ingredients extracted from foods (such as oils, fats, sugar, starch, and proteins); modified food components (like hydrogenated fats and modified starch); or synthetic compounds created in laboratories from food-derived or other organic materials (including flavour enhancers, colourants, and various additives designed to enhance palatability).[28]

Ultra-processed foods are typically calorie-dense but nutritionally poor, providing high energy levels while lacking essential vitamins, minerals, and fibre. Additives such as refined sugars, unhealthy fats, and synthetic flavour enhancers dominate their composition, displacing natural sources of nutrition. While ultra-processed foods may be convenient and affordable, their regular consumption often fails to meet the body's needs for fundamental nutrients.[29] This nutritional void is particularly concerning in populations where these foods dominate daily intake, as they are poor substitutes for whole, nutrient-rich foods.

In many high-income countries, ultra-processed foods now account for over 50% of total energy intake, with concerning trends of rapid increases in consumption across low- and middle-income nations over the past three decades. Even within countries, some demographic groups exhibit particularly high consumption rates, reflecting disparities in dietary quality and exposing vulnerable communities to heightened health risks. Disparities have been associated with the consumption of ultra-processed foods, particularly the higher intake of sugary

beverages within Native American communities.[2] For instance, diabetes affects 18.8% of Native American communities compared to the U.S. average of 10%, while obesity rates are significantly higher at 47.4% among Native Americans versus the national average of 29.8%.[30]

In particular, poor and low-income groups often have easier access to ultra-processed foods than to more nutritious whole foods. This can lead to an overconsumption of macronutrients, such as refined carbohydrates and unhealthy fats, while simultaneously causing deficiencies in essential micronutrients, such as vitamins and minerals. This dual issue—excessive calorie intake combined with nutrient deficiencies—can contribute to malnutrition and related health issues.[31]

In some of the most economically developed nations, the dominance of ultra-processed foods in diets is striking. In the USA, ultra-processed foods contribute 57.9% of total energy intake,[32] while the UK and Canada see similar patterns at 56.7%[33] and 47.7%,[34] respectively.

Among the top fifth of ultra-processed foods consumers in countries like the USA, UK, and Australia, ultra-processed foods constitute between 70% and 80% of their diets.

These dietary habits lead to imbalanced eating patterns characterised by frequent snacking and the exclusion of fresh, nutrient-dense food options,[26] which are strongly associated with an increased risk of obesity, type 2 diabetes, cardiovascular disease, and other chronic health conditions.

Globalisation and urbanisation have accelerated the spread of ultra-processed foods into developing countries, reshaping traditional diets.[35] Ultra-processed foods are often more affordable and accessible than healthier options, increasing uptake particularly in low-income populations. This disparity arises because ultra-processed foods are typically less expensive to produce and have longer shelf lives, making them more readily available in low-income communities.[36] Consequently, individuals in these communities may rely more heavily on ultra-processed foods, which can lead to poorer dietary quality and associated health risks.

Heavy reliance on ultra-processed foods, high in fat, sugar and salt, contributes to widespread malnutrition and micronutrient deficiencies. Iron, magnesium, potassium, and vitamins like A, D, and B-complex are among the critical nutrients that are often insufficient in diets high in ultra-processed foods. For instance, refined grains lack the fibre and magnesium found in whole grains, while sugary beverages and snacks do little to provide potassium or vitamin C. These deficiencies can have profound health implications, in the form of non-communicable diseases.[30]

Antimicrobial resistance and the food system

Antimicrobial resistance is one of the top global threats to public health and the economy, directly causing 1.27 million deaths globally each year and indirectly contributing to another 3.68 million deaths annually, where antimicrobial resistant infections may have played a role in mortality.[3]

Antimicrobial resistance is driven by the overuse and misuse of antibiotics in humans, animals and plants which means bacteria, viruses and fungi no longer respond to the medicines used to treat infectious diseases. As a result, these drugs become ineffective, and infections become more difficult or impossible to treat. The result is an increased risk of the spread of disease, serious illness, disability and death in both humans and animals. These risks are exacerbated by the lack of discovery and development of new antibiotic drugs.

> *In 2016, the UN recognised that the inappropriate use of antimicrobial medicines in animals is a leading cause of the growing global crisis.[37]*

As demand for animal products has increased globally, the expansion of intensive industrial livestock production and aquaculture has seen antimicrobial medicine use increase, as animals are mass-medicated to prevent infection in crowded conditions and to promote growth in livestock.

Foods of animal origins are the main source of antimicrobial resistance in the food system, particularly meat from domesticated livestock such as poultry, pigs, cattle, goats and sheep.[38] Seafood from aquaculture farms are also known to be hotspots of antimicrobial resistance, due to more significant genetic exchange which increases seafood's susceptibility to becoming drug resistant.[39]

Today, an estimated 73% of antimicrobial medicine sold globally is used in animals reared for food, and sales are expected to increase by 11.5% by 2030 to 104,079 tonnes per year.[39] The rise in antibiotic use in the food system has contributed to the spread of drug resistance in both humans and animals.

Antimicrobial-resistant organisms in food are a serious issue for human health food-borne diseases causing an estimated 600 million illnesses and 420,000 deaths per year, with over a quarter of deaths in children under 5.[40] Drug-resistant bacteria can be transmitted from farm animals to humans through the direct consumption of meat or milk, from surfaces on which food is prepared or via water and soil containing animal faeces. Food products may also contain antibiotic-resistant organisms from contaminated water or soil.

Antimicrobial drug use on farms can contaminate the surrounding environment leading to drug-resistant microbes that can harm human health. People who work closely with animals or live near farms can experience negative health impacts from antimicrobial resistance in livestock.

There is relatively limited data on antimicrobial resistance related to foods of non-animal origin, but data from 2007 - 2011 indicated that these goods were linked with 10% of foodborne pathogen outbreaks.[41] These stem largely from foods such as Salmonella-contaminated leafy greens, tomatoes, stem vegetables and melons, as well as E. coli-contaminated legumes and grains.

Industrial livestock production and antimicrobial resistance

Antimicrobial medicines are essential to intensive industrial animal farming systems on land and in water, with thousands of animals kept in confined spaces. In this context, companies routinely mass medicate livestock and fish with antibiotics to reduce mortality and promote growth.

The WHO classifies antibiotic use in animals into three major categories:[42]

- **Therapeutic use:** antibiotic medicines used to treat animals with clinically diagnosed infectious diseases or illnesses.
- **Disease prevention:** the use of antibiotics in healthy animals which may be at risk of infection. In this case antibiotics are often used as a substitute for good hygiene and farming practices that would otherwise prevent or reduce infection in livestock and fisheries.
- **Growth promotion:** antibiotics used at subtherapeutic concentrations to increase weight gain in animals, with drugs often added to animal feed. It is not known exactly how growth promotion works, but current theories include altering the gut microbiome of animals, reducing competition for nutrients, improving nutrient absorption or reducing pathogenic bacteria especially among animals in crowded living conditions.

The use of antibiotics to promote growth in livestock is a significant contributor to the overuse of antibiotics in the food system and more broadly. Analysis has found that countries applying such medication for growth promotion use 45% more of these drugs per kilogram of animal biomass compared to countries that do not use growth promotors.[43] The crowded conditions in industrial livestock production create the perfect conditions for drug resistance to spread rapidly.

Many antimicrobial medicines which are medically important for use in humans are currently used in beef, dairy, pork and poultry industries, posing a significant risk to human health. The widespread use of these antibiotics leads to drug resistance in food-producing animals, which can in turn cause disease in humans (e.g. enterococci, E. coli, campylobacters and salmonellae) which can be difficult or impossible to treat.

Research has shown that there is a persistent lack of awareness about antimicrobial use and resistance among livestock and aquaculture farmers, particularly in middle- and low-income countries, with evidence of antibiotic use practices that contribute to the development and spread of drug resistance among farms.[43] Farms often rely on untrained workers for disease management which promotes and exacerbates

the inappropriate use of antibiotics. Further up the supply chain, workers handling food can spread antimicrobial-resistant bacteria via poor hygiene practices or cause cross-contamination from handling contaminated food.[44]

Trends in antibiotic use and antimicrobial resistance in the food system

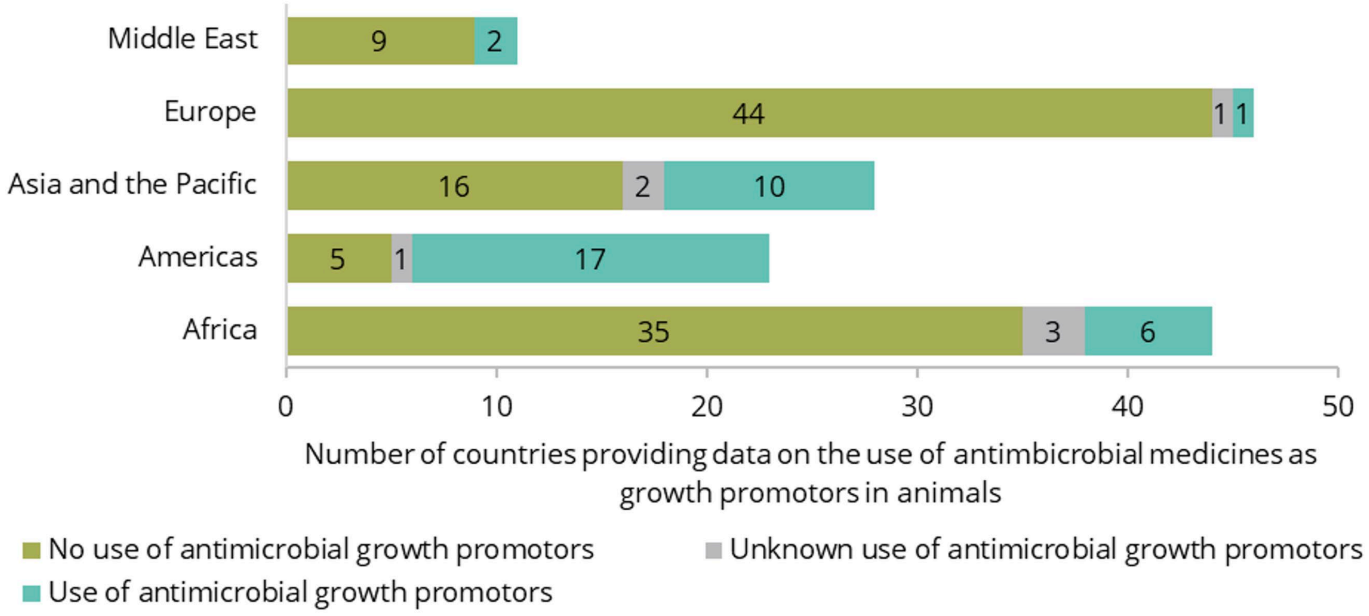
An estimated 88,927 tonnes of antimicrobial products were used in animals reared for food globally in 2021.[45] From 2019 - 2021, the overall use of antimicrobials in animals increased by 2% globally from 107.3 mg/kg of animal biomass to 109.7 mg/kg. In this period, the Americas, Europe and Asia Pacific regions saw a decrease in antimicrobial use by 9%, 6% and 0.7% respectively, while Africa saw a 179% increase in use, although this may be down to better monitoring systems and improved use estimates.

However, Africa's overall antimicrobial use represents only 2% of volumes for the 81 countries that report to the World Organisation for Animal Health. On the other hand, China has been identified as the world's leading producer and consumer of antibiotics for both humans and animals.[46]

The use of antibiotics for growth promotion in animals remains relatively widespread, despite the high risk of causing antimicrobial resistance. In 2021, 36 of the 152 World Organisation for Animal Health member countries reported the use of antimicrobial medicines as growth promotors in animals reared for human consumption. 75% of the 36 countries are located in the Americas or Asia and the Pacific regions.

In addition, two of the most frequently used antibiotics used as growth promotors by these countries - bacitracin and tylosin - are classed as critically important for use in humans in the WHO's latest List of Medically Important Antimicrobials.[46] Despite their critical role in human medicine and the significant risks associated with their misuse in animals, they continue to be widely used as growth promote.

Figure 7: Number of countries using antimicrobial medicines for growth promotion in animals in 2021. (Source: World Organisation for Animal Health, 2024)[47]



Trends in antimicrobial resistance and human health

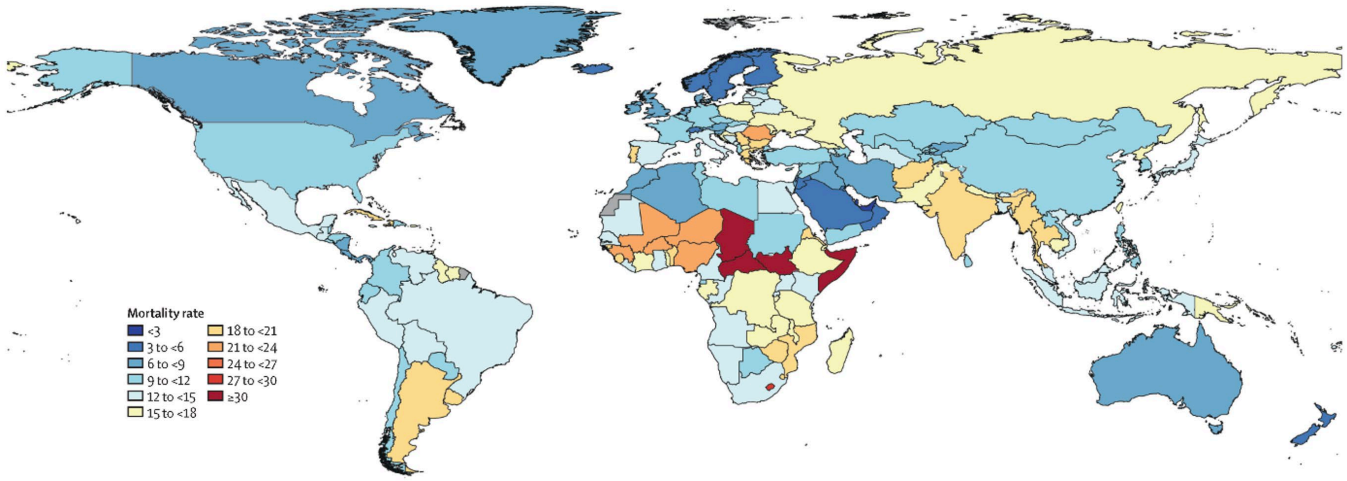
The problem of antimicrobial resistance in humans is expected to grow. Globally, antimicrobial resistance-related deaths are expected to double from nearly 5 million today to 3 to 10 million by 2050,[48] with many more people suffering from ill health as infections become more difficult or impossible to treat.

> *Around 90% of direct deaths from antimicrobial resistance occur in low- and middle-income countries, despite having lower antibiotic use per capita than high-income countries.*[3]

In addition, 99.65% of the children under five who die from antimicrobial resistance globally are in low- and middle-income countries, accounting for an estimated 252,833 deaths per year.[49] Considering the low number of antimicrobial-resistance related deaths among children under 5 in high-income countries (893 per year), large numbers of these deaths are preventable.

These trends may be linked to the fact that antibiotic use is often less well-regulated in low- and middle-income countries, and their healthcare services often have less capacity to respond.

Figure 8: Death rates per 100,000 attributable to antimicrobial resistance (Source: Naghavi et al.,2024)[50]



Economic impact of antimicrobial resistance

In addition to the health impacts detailed above, antimicrobial resistance has significant economic costs across the global economy.

> *The World Bank has estimated that by 2030, it could cause losses to annual GDP ranging from $ 1 trillion to 3.4 trillion.*[51]

Negative economic impacts are projected to rise dramatically by 2050 equating to a 3.8% reduction in GDP worldwide and creating $ 1 trillion in additional healthcare costs alone.

> *Antimicrobial resistance in livestock in particular poses a systemic risk to the food and agriculture sectors as well as the pharmaceuticals, healthcare and insurance sectors.*

Drug resistance affects the health of animals and plants, reducing agricultural productivity and threatening food security.

The economic risks are substantial: from 2025 - 2050 a total of $ 575 billion – $ 953 billion global GDP could be lost due to antimicrobial resistance in livestock.[43] Additionally, it has been estimated that lower productivity as a result of the harmful spillover effects of drug resistance in livestock on human health could cause a loss of $ 1.1 trillion – $ 5.2 trillion in GDP cumulatively over the same period.

In terms of food security, by 2050 annual antimicrobial-related livestock production losses are estimated to be equal to the consumption needs of 746 million people under a best-case scenario and up to 2 billion people under the most pessimistic scenario.[43] By 2050, the World Bank has estimated that antimicrobial resistance could see global animal production reduced by 2.6% - 7.5% from a 2019 baseline.[52] Within this, cattle and poultry meat production are predicted to see the biggest livestock production losses.[43]

Research has found that nearly 10% of global equity markets, worth $ 14.6 trillion, are exposed to antimicrobial resistance-related risks from food, agriculture, pharmaceuticals, healthcare and insurance sectors.[53] Publicly listed companies in developed markets are more exposed than their peers in emerging markets based on enterprise value (including cash). Companies in the US are the most exposed compared to any other region, followed by those based in Europe, based on absolute valuation.

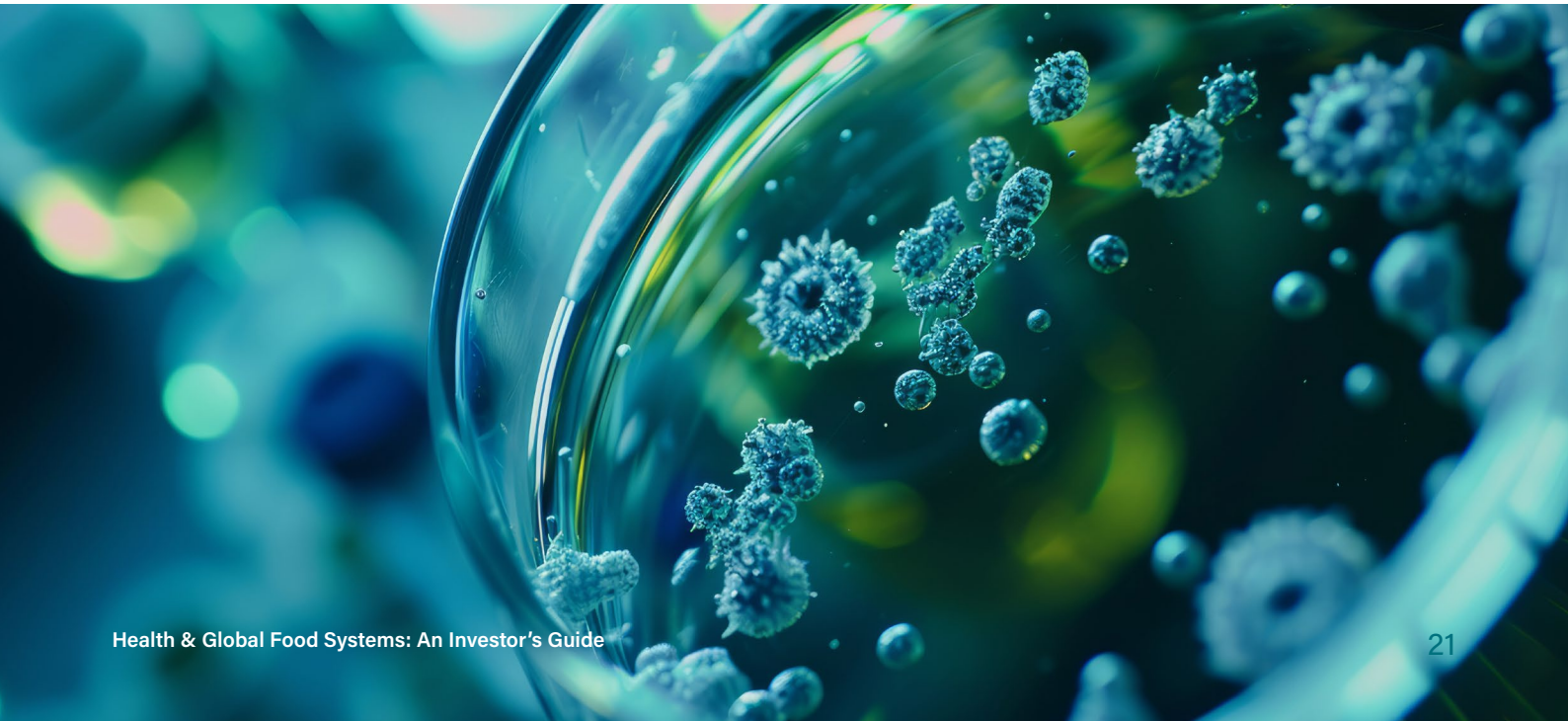
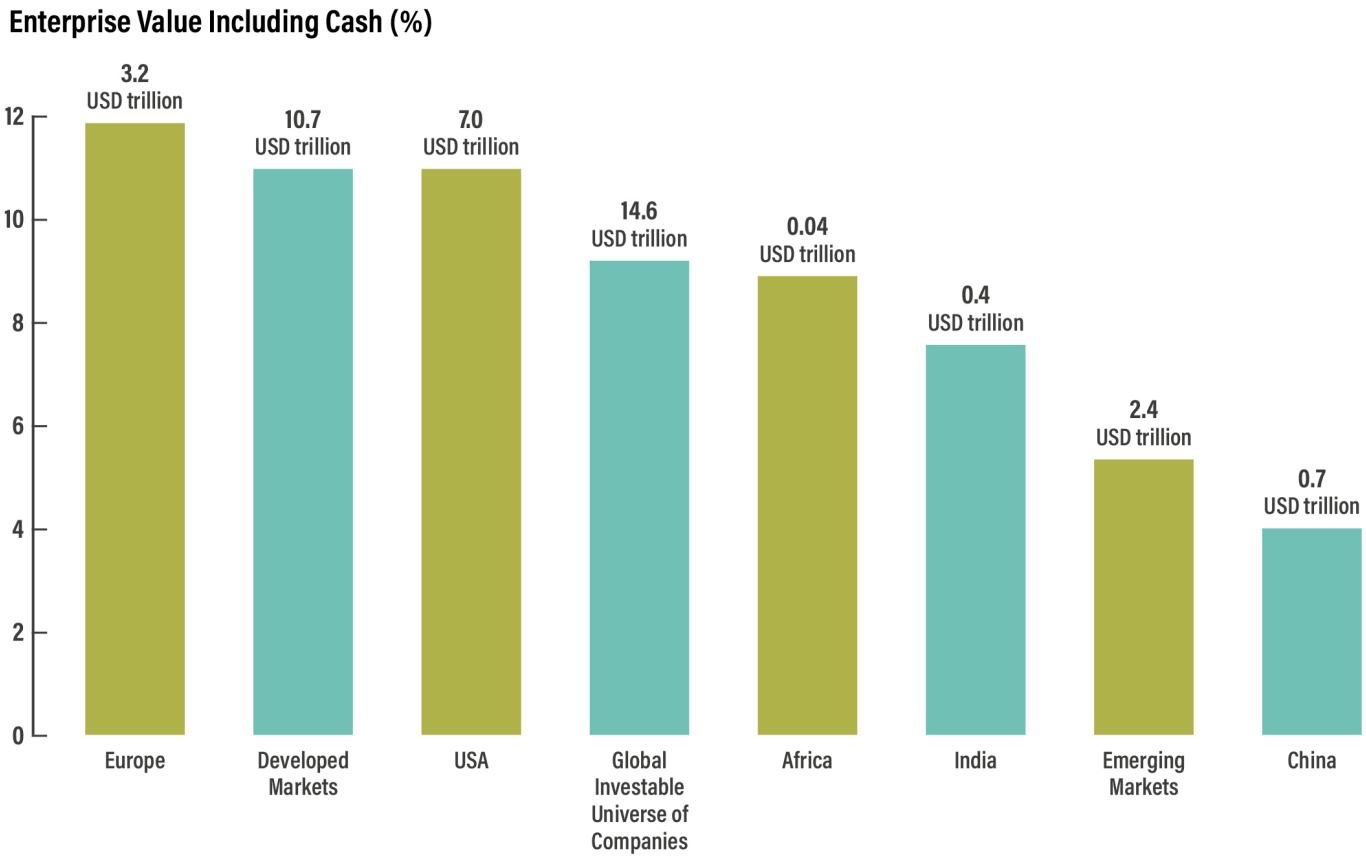


Figure 9: Assets exposed to AMR risks. (Source: MSCI Sustainability Institute & FAIRR Initiative, 2024)[e 54]



These businesses (particularly agriculture and aquaculture producers) may see veterinary costs increase as infectious diseases become more difficult to treat due to antimicrobial resistance. Companies may also face a loss of productivity on farms and in aquaculture operations due to increased morbidity and mortality caused by outbreaks of drug-resistant infection, as well as higher insurance premiums due to the impacts of antimicrobial resistance in their own operations and supply chains.

The economic impacts of antimicrobial resistance span the global economy, and significant action is needed to manage these risks to the food system.

e Enterprise value including cash (EVIC) exposed to AMR risks– expressed as a percentage of the investable companies universe per region

How are marketing practices within the food sector impacting human health?

Marketing strategies play a pivotal role in shaping consumer behaviour, influencing not only what people buy but also their long-term preferences and consumption patterns. The food and beverage industry, in particular, has mastered the art of leveraging marketing to promote its products, often targeting specific demographics to maximize impact. While these strategies can drive significant profit, they raise important ethical and public health concerns when they involve promoting unhealthy products, such as ultra-processed foods.

This section will explore how marketing practices in the food and beverage sector influence consumer choices, dietary habits, and health outcomes.

It will focus particularly on children, adolescents, and people of colour, as these groups are disproportionately targeted by food marketing and are especially vulnerable to its effects. Children and teenagers are impressionable, with developing preferences and habits that are easily shaped by exposure to advertising. Similarly, people of colour often face a "double dose" of marketing due to targeted campaigns combined with general advertisements, which compounds existing health disparities in these communities.

By examining the tactics used—such as TV advertising, digital media, celebrity endorsements, and targeted marketing—and the associated health impacts, this section will highlight the urgent need for stronger regulatory oversight to address these practices and protect public health. In addition to regulatory action, meaningful stakeholder engagement—including collaboration between industry, public health experts, and advocacy groups—is essential to promoting responsible marketing practices. Engaging key stakeholders can help establish industry best practices, encourage voluntary commitments, and drive systemic changes that support healthier consumer choices.

Marketing strategies impacting children and adolescents

TV advertisements

Television advertising remains one of the most influential mediums for promoting unhealthy, high fat, sugar and salt food products, to children and adolescents. Advertising of ultra-processed food is particularly harmful as childhood obesity and malnutrition can cause adverse effects on children's physical, social and emotional wellbeing. It increases the risk of diet-related noncommunicable diseases in childhood and the physical and metabolic changes childhood obesity brings can carry into adult life, increasing the risk of non-communicable diseases later in life.[22]

In 2019, U.S. fast-food advertising spending exceeded $5 billion, representing a 9% increase from the $4.6 billion spent in 2012. Television accounted for a staggering 91% of total advertising expenditures in this category, highlighting its dominance as a marketing channel. Contrary to popular belief, most of the exposure to unhealthy food advertisements among young people occurs on general TV programming rather than children's TV channels. For example, preschoolers, children, and teens were exposed to only 10%, 11%, and 5% of fast-food adverts on children's programming, respectively. This indicates that advertising strategies targeting young audiences are pervasive across a broader spectrum of television content.[6]

The overall volume of food and beverage advertisements during children's programming has also increased significantly, with 23% of all adverts in 2018 promoting such products, compared to just 14% in 2012.[55] Alarmingly, the majority of these adverts were for unhealthy food products, with 65% failing to meet the food industry's voluntary nutrition standards for advertising to children, and 99% falling short of proposed U.S. federal government standards.[6] Despite restaurants public commitments to offer healthier menu options, fast-food TV advertisements overwhelmingly focus on regular menu items or general branding, devoting four to six times as much promotional effort to value menus and meal bundles compared to healthier options.[6]

Digital advertising

Digital media has become a powerful avenue for food and beverage companies to target children and adolescents, who are spending increasing amounts of time online. Social media platforms have become integral to young people's daily lives, with children as young as age three engaging in digital content.[56] Research into child-centric long-video platform channels revealed that 38% of adverts in 2020 were for food or beverages, with more than half promoting energy-dense, nutrient-poor products. Branded products and child-influencer endorsements further embed unhealthy food marketing into content that appears entertaining and harmless to young viewers.[57]

The transition from traditional television to online platforms has given rise to sophisticated marketing strategies. Digital advertisements often appear seamlessly integrated into entertainment, making it difficult for children to distinguish between content and marketing. Studies show that 72% of children and adolescents report encountering food or beverage marketing on social media, with 44% of these adverts promoting fast food and 9% featuring sugar-sweetened beverages.[58]

Influencer marketing—a $24 billion industry[59]— has become increasingly common, where companies pay social media celebrities to promote products in ways that resonate with young audiences. For example, an analysis of 400 videos posted by child influencers on a long-video platform found that 65% featured food-related content, with 91% promoting ultra-processed food products.[57] Despite recent policy changes, such as bans on food and beverage advertising on "made-for-kids" content in 2020[60] and restrictions on high-fat, salt, and sugar adverts in the EU and UK,[61] these regulations do not extend to influencer marketing.[62] This gap highlights the need for stronger regulatory oversight to ensure children and adolescents are safeguarded from the influence of digital advertising for unhealthy food.

Celebrity endorsement

Celebrity endorsements are a prominent strategy used by the food and beverage industry to market their products, leveraging the appeal of famous celebrities to influence consumer behaviour.[63] These endorsements often create an implicit association between the promoted products and health, fitness, or glamour, even when the products themselves are nutritionally poor. Research examining celebrity endorsements of food between 1990 and 2017 in the U.S. found that two-thirds of celebrity endorsed brands and products, were tied to unhealthy food and beverage items.[62] This raises concerns about the potential role of these endorsements in normalising the consumption of ultra-processed foods, particularly among young audiences.

Popular music celebrities also play a significant role in shaping food preferences. A study analysing 590 endorsements made by 163 celebrities revealed that 18% were for food and beverage companies, with 71% of non-alcoholic beverage endorsements promoting sugar-sweetened drinks. Similarly, 81% of the 26 food-related endorsements featured ultra-processed foods.[64] Evidence shows that children and adolescents find these celebrity-endorsed products more desirable than alternatives that are not promoted by famous figures. This increased desirability underscores the influence of celebrity endorsements in driving unhealthy eating habits, particularly among impressionable young consumers.[65]

Targeted marketing to people of color

Target marketing is a key strategy employed by food and beverage companies to appeal to specific demographics by tailoring campaigns based on race, ethnicity, age, and other characteristics.[66] This approach often makes products feel personalized or culturally relevant, but when it comes to targeting children of colour, it raises significant concerns.[67] Research shows that the majority of products marketed to these demographics are unhealthy, including junk food, sugary beverages, and other energy-dense, nutrient-poor products.[68] Children of colour are particularly appealing targets for marketers due to their growing population size, spending power, and higher media exposure, which make them a lucrative demographic for food companies.[67]

In 2017, U.S. food companies spent over $1 billion on advertisements targeting Black and Hispanic audiences through Spanish-language and Black-targeted television.[66] Over 80% of these adverts promoted fast food, sugar-sweetened beverages, candy, and unhealthy snack brands.[67] Studies have shown that Black children and adolescents saw nearly twice as many food advertisements compared to their White peers.[67] This targeted approach extends beyond television and online platforms into other key areas where children live, learn, and play, including schools, childcare centres, and community events. Companies also rely on initiatives like celebrity endorsements,

scholarships, and sponsorships of music and sporting events to engage these children and teens, further embedding their brands into the fabric of these communities.[67]

The rise of children-focused marketing dates back to the 1990s when food companies, under pressure from investors, sought new revenue streams by creating a market specifically for children. What began as a niche market for breakfast cereals rapidly expanded; by 2004, there were approximately 500 products targeting youth compared to only 50 in 1994.[69] This surge in youth marketing disproportionately impacted communities of colour, where targeted advertising and limited access to healthy foods compound existing health disparities. Latinos and African Americans are nearly twice as likely to have diabetes compared to non-Hispanic Whites, and Native Americans are more than twice as likely. These groups also face higher diabetes-related mortality rates and complications, such as kidney damage, driven in part by the aggressive promotion of unhealthy products to children in these communities.[70]

One of the most concerning aspects of targeted marketing is the "double dose" effect, where children of colour are subjected to both targeted campaigns and general advertising messages. This dual exposure amplifies the influence of unhealthy food marketing, further normalising the consumption of ultra-processed foods.[69] By engaging in community-focused initiatives like scholarships and charitable donations, companies often insulate themselves from criticism while continuing to promote products that exacerbate public health issues like obesity, diabetes, and high blood pressure.[67]

Targeting of Native American communities by beverage companies in the U.S.

The promotion of sugary beverages is widely seen as a contributing factor to rising rates of chronic diseases such as diabetes, heart disease, and obesity within Native American communities.[71] Diabetes, in particular, has been a significant concern, with Native American communities experiencing disproportionately high rates compared to other ethnic groups in the United States.[30] Heart disease and obesity are similarly prevalent, and the availability of cheap, sugary drinks has been criticised for exacerbating these existing health disparities.[30]

Beverage companies' marketing strategies, which can include sponsorships of local events and the use of culturally relevant imagery, further entrenched these unhealthy products within the fabric of communities. Public health campaigns and advocacy groups, recognising the harmful effects of increased soda consumption, launched efforts to raise awareness and reduce soda intake in these communities. These campaigns highlighted the connection between the widespread availability of sugary drinks and the rising rates of chronic diseases in within these communities across the U.S.[72]

Native American organisations began advocating for comprehensive strategies to restrict the sale and marketing of sugary drinks within their communities. The calls for action gained traction, with many arguing that the promotion of such products in vulnerable communities was a form of exploitation.[73] Although not directly correlated to these proceedings beverage companies began to make some changes to their product offerings. Several companies committed to reducing the sugar content in some of their beverages and began to explore alternative options with lower sugar content.[74] The Healthy Diné Nation Act (HDNA) was also introduced which places a 2% tax on certain food items such as sugar sweetened beverages. Revenues generated by the tax support community wellness projects in Chapters on the Navajo Nation.[75]

Impact of marketing practices on consumer behaviour and health outcomes

Marketing practices targeting children and adolescents have a profound impact on their consumer behaviour and health outcomes.

In addition to influencing brand loyalty, marketing practices contribute to higher intake of unhealthy and ultra-processed foods, a major driver of poor health outcomes. Research examining the effects of advertising on social media have found a direct correlation between exposure to promotions of unhealthy snacks by influencers and increased snack consumption.[76] Three studies demonstrated higher snack intake was linked to social media influencer promotions.[73] Another study found that exposure to generally unhealthy food advertising led to significant increases in the intake of energy-dense snacks by consumers.

The marketing of ultra-processed foods has been shown to not only increase the consumption of advertised products but also elevate overall food consumption.[77] Even brief exposure to unhealthy food advertisements significantly influences children's ability to recognize brands and creates positive associations with those brands. A 2019 study found that children who were exposed to food brand advertisements could recognize the brand afterwards, potentially fostering long-term brand loyalty.[78]

> *This early brand recognition can shape purchasing choices and preferences into adulthood.*[79]

This can exacerbate the risk of obesity and other non-communicable diseases, underscoring the critical need for stricter regulation of marketing practices, particularly those targeting children and adolescents and people of colour.

Mitigation of health risks linked to global food sector business practices

Policy interventions are pivotal in addressing diet-related health issues by creating environments that support healthier food choices and promote equitable access to nutritious options. Evidence demonstrates that well-designed regulatory measures, such as economic tools, mandatory labelling, and food composition reformulations, can significantly influence consumer behaviour, improve dietary patterns, and reduce the social and economic burden of diet-related diseases. The adoption of regulations related to diet-related health has increased over the last decade with more economic tools such as sugar taxes, and food labelling regulations coming into places such as Chile, the UK, and Mexico.

Policies also help level the playing field for industry players, ensuring that competitive pressures do not compromise public health goals. While some companies are stepping up by strengthening their policies, commitments, and practices to produce healthier food options, there is still more that companies need to do. Many companies still face challenges in aligning their strategies with public health objectives, and a considerable gap remains in achieving widespread industry accountability and meaningful change.

Policies aimed at reducing the misuse and overuse of antibiotics, particularly those critical to human health, play a crucial role in addressing antimicrobial resistance.

> *Antimicrobial use policies are among the most effective measures for curbing the use of antibiotics in farming.*

As regulation intensifies, companies will increasingly need to respond to mitigate both health and economic risks associated with antimicrobial resistance.

Categories of health-based food policies

Within this section, we will examine key categories of food policies designed to promote healthier dietary behaviours and address the global burden of diet-related diseases. These categories include:

1. **Economic tools – Policies such as taxes on unhealthy foods and subsidies for nutritious options leverage financial incentives to influence consumer behaviour.**
2. **Food labelling – Initiatives such as front-of-package labelling provide consumers with clear and accessible nutritional information.**
3. **Food composition – Reformulation strategies focus on improving the nutritional profile of food and beverage products by reducing harmful components like sugar, salt, and fats.**
4. **Restrictions on placement – Policies targeting the placement of unhealthy foods and beverages in retail environments seek to minimize their visibility and accessibility.**
5. **Marketing restrictions – Policies targeting the marketing of unhealthy foods to vulnerable groups.**
6. **Mandatory reporting – Reporting requirements for large food businesses create transparency and accountability.**

Each of these policy categories addresses different aspects of the food environment and consumer behaviour. Together, they form a comprehensive framework for reshaping food systems to promote healthier, more sustainable dietary patterns.

Among the various health-based food policies, food labelling, particularly front-of-package labelling, is one of the most widely implemented measures, with strong adoption in the EU, UK, Australia, and Japan.[80] Economic tools, such as sugar taxes, have also gained momentum, especially in the UK (Soft Drinks Industry Levy) and parts of the EU, though they remain less prevalent in regions such as Japan and Australia.

In the following sections, we will delve into the adoption, effectiveness, and challenges associated with these policy approaches.

Economic tools

Economic tools, such as taxes on foods high in fat, salt, or sugar, are among the most effective regulatory measures to encourage healthier dietary behaviours. These taxes can significantly reduce the sale, purchase, and consumption of unhealthy foods, leading to lower obesity rates and other diet-related health conditions.[81]

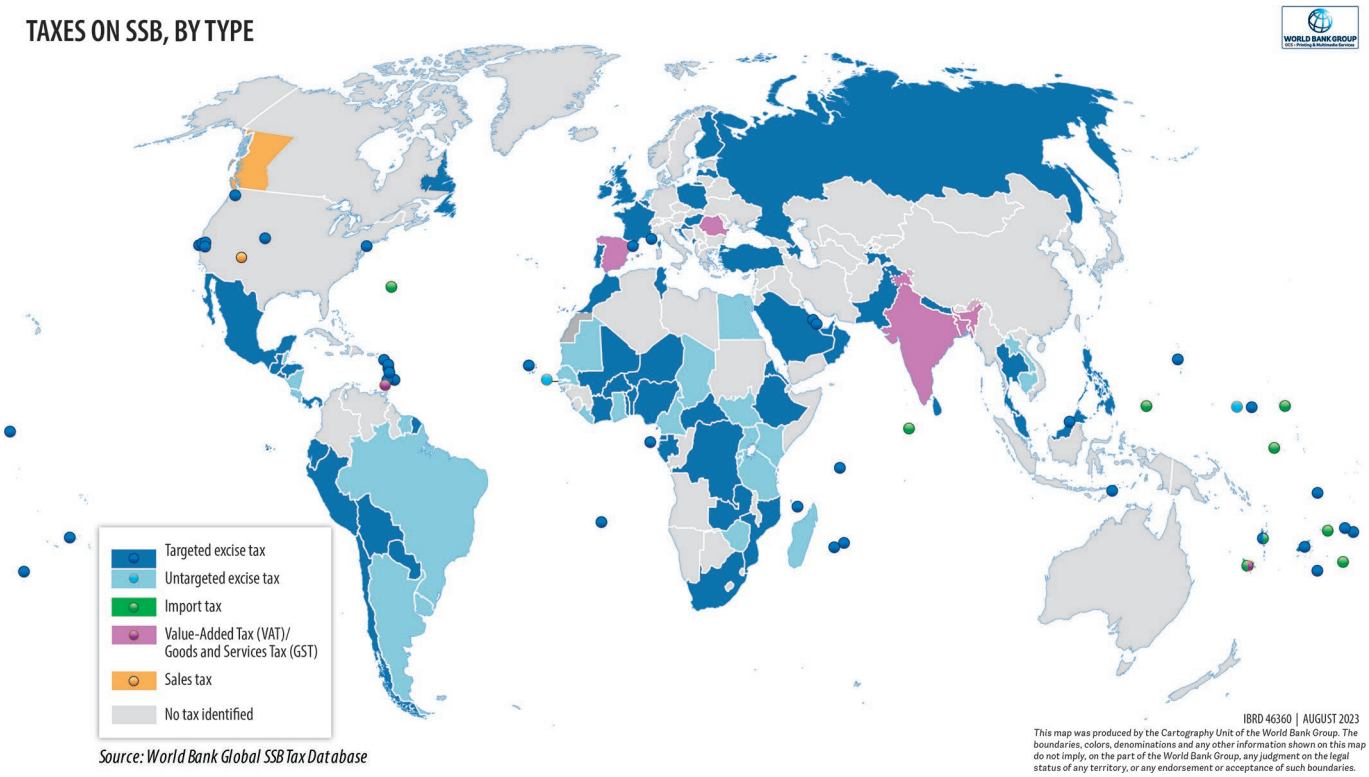
Sugar taxes

Sugar taxes, most commonly implemented as sugar-sweetened beverage taxes, are a policy mechanism aimed at reducing the consumption of sugary products to improve public health and curb the rising rates of obesity, diabetes, and other diet-related diseases.

These taxes typically apply to beverages with added sugars, though in some jurisdictions, they extend to other sugary products such as candies and desserts. The rationale behind sugar taxes is grounded in public health evidence linking excessive sugar consumption to a range of health problems, including obesity, type 2 diabetes, and cardiovascular diseases.[82]

Sugar-sweetened beverage taxes are among the most widely implemented economic tools for public health. Currently, there are 119 national-level sugar-sweetened beverage taxes in place, spanning 117 countries and territories and impacting 57% of the global population.[83]

Figure 10: Geographic analysis of taxes on sugar-sweetened beverages (Source: World Bank, 2024)[82]



One of the primary objectives of sugar taxes is to create a financial disincentive for purchasing sugary products. By increasing the price of these items, policymakers aim to encourage consumers to shift towards healthier alternatives.[84] For example, in Mexico, a one-peso-per-litre tax on sugary drinks implemented in 2014 resulted in a 6% decrease in their consumption in the first year.[85] Similar results have been observed in other countries, such as the UK, where the Soft Drinks Industry Levy not only reduced the sugar sold in soft drinks by 35.4% between 2015 and 2019[86] [87] but also incentivized manufacturers to reformulate their products to contain less sugar.[88]

Despite their potential benefits, sugar taxes have faced significant opposition, particularly due to extensive lobbying efforts by the food and beverage industry aimed at preventing their implementation or repealing them where they exist[89] Industry groups often argue that sugar taxes are economically harmful, disproportionately burden low-income consumers, and are ineffective in achieving meaningful public health outcomes. These arguments are strategically promoted through well-funded lobbying campaigns that target policymakers and regulatory agencies.[90]

Food and beverage companies have also invested heavily in public relations initiatives to sway public opinion, framing sugar taxes as unfair or unnecessary.[91] In some cases, these organizations fund research that downplays the health risks associated with sugar consumption or questions the efficacy of taxation as a public health tool. These coordinated lobbying efforts often result in delays or compromises in the design and enforcement of sugar tax policies, undermining their intended public health impact.[92]

From a regulatory perspective, the implementation of sugar taxes has sparked debates about their design and enforcement. Key considerations include the scope of taxed products, the level of taxation, and the allocation of generated revenue.[93] In many cases, the scope of taxed products is limited to sugar-sweetened beverages, often due to lobbying by food and beverage industries to exclude other sugary products like confectionery or baked goods.[94] The level of taxation also plays a critical role, as overly high taxes can disproportionately impact low-income households, sparking concerns about equity and affordability.[95] However, when revenues are allocated effectively -such as funding public health initiatives or subsidising access to healthy foods - they can mitigate these concerns and enhance the policy's positive impact.

Fat taxes

Fat taxes, which impose levies on products containing high levels of saturated or trans fats, are a less widely adopted economic tool compared to sugar taxes. These taxes are designed to disincentivize the consumption of unhealthy fats, which are linked to increased risks of cardiovascular disease, obesity, and other diet-related health problems.[96] Unlike sugar taxes, which have seen global adoption, fat taxes remain uncommon, with Ethiopia being the only country to implement such a policy.[97]

In February 2020, the Ethiopian Parliament introduced a groundbreaking tax on food products with high levels of saturated fats or trans fats.[98] This tiered taxation system aims to deter the production and consumption of unhealthy fats while encouraging transparency in food labelling.

Despite their potential benefits, fat taxes are often criticized for being regressive, disproportionately affecting low-income groups.[95] Food taxes take a larger share of income from the poor than the rich; indirect taxes of this sort are invariably regressive unless the targeted product is a luxury or disproportionately consumed by wealthier individuals, which is not the case for saturated fats and oils. This concern was exemplified by Denmark's short-lived fat tax policy introduced in 2011. While the tax did lead to changes in consumer behaviour, it did not achieve the intended health outcomes. Instead, many consumers switched to cheaper alternatives with similar fat content, undermining the health objectives of the policy. Ultimately, the Danish fat tax was abandoned just fifteen months after its introduction, illustrating the challenges of implementing such measures equitably and effectively.[95]

Lower import tariffs for healthy food

Lowering import tariffs on healthy foods is a less commonly utilized economic tool, with only 2 countries - Tonga and Fiji - implementing such policies. These policies aim to make nutritious foods more affordable and accessible, particularly in regions where healthy options are often cost-prohibitive due to high import taxes.

In Fiji, the government has significantly reduced import tariffs to encourage the consumption of fruits and vegetables. The excise duty on these nutritious foods was entirely removed, and import taxes for most varieties were reduced from 32% to just 5%. This policy is intended to promote healthier dietary habits by reducing the cost barrier for these essential food groups, making them more affordable for a broader section of the population.[96]

Similarly, Tonga has implemented a policy to lower import duties on healthy food products, specifically targeting fresh, tinned, or frozen fish. Import tariffs were reduced from 20% to 5%, increasing the affordability of a key source of lean protein. This policy aligns with the broader goal of promoting healthier diets, particularly in island nations like Tonga, where imported food plays a substantial role in the national food supply.[96]

Lowering tariffs on nutritious imports can be a particularly effective tool in low—and middle-income countries, where affordability is a significant barrier to healthy eating. However, such policies require careful design and implementation to ensure they deliver the intended outcomes and align with other economic tools and policies.

Subsidies for healthy food

Subsidies for healthy foods represent an important, underutilised, policy tool to promote healthier diets and improve public health.[99] Agricultural subsidies total approximately $ 650 billion globally and are predominantly allocated to staples, oils, and sugar.[100] There is growing recognition that aligning these subsidies with public health could drive meaningful improvements in dietary patterns. Restructuring subsidies toward healthy crops and nutritious foods could enhance health outcomes globally, while providing financial support for farmers or food producers.[101]

Despite these potential benefits, health food subsidies are still rare.[96] Canada, for example, has adopted a targeted subsidy program to address the unique challenges faced by isolated northern communities, where nutritious foods are often prohibitively expensive due to transportation costs. The Nutrition North Canada program provides retail-based subsidies, enabling local retailers and suppliers to lower the cost of perishable healthy foods such as meat, fish, eggs, milk, bread, fruits, and vegetables. By improving affordability, the program aims to reduce barriers to accessing healthy food and improve dietary outcomes in these remote regions.[96]

Romania also offers an example of how subsidies can be used to promote healthy eating, particularly among children. The Romanian government provides financial aid for schools to supply fruits and vegetables, encouraging healthier eating habits at a young age. By integrating these foods into school programs, the government addresses nutritional deficiencies and sets the foundation for healthier dietary behaviours.[96]

Although promising, the limited adoption of subsidies for healthy foods suggests a significant opportunity to expand their use. Reallocating even a fraction of existing agricultural subsidies toward nutritious foods could have profound impacts on health and environmental outcomes. However, effective implementation requires careful planning to ensure that subsidies reach the populations most in need and address barriers such as affordability, access, and food distribution infrastructure.

Corporate responses and best practices

In response to regulatory and policy pressures, food and beverage companies have adopted various strategies to navigate the changing landscape of economic tools like sugar taxes, fat taxes, and subsidies. Many corporations actively engage in reformulation efforts, reducing sugar, salt, and unhealthy fats in their products to comply with new regulations while maintaining consumer demand. For instance, in response to the UK Soft Drinks Industry Levy, several beverage manufacturers reformulated their products to contain less sugar, thereby avoiding higher taxation and maintaining market competitiveness.[102] [103]

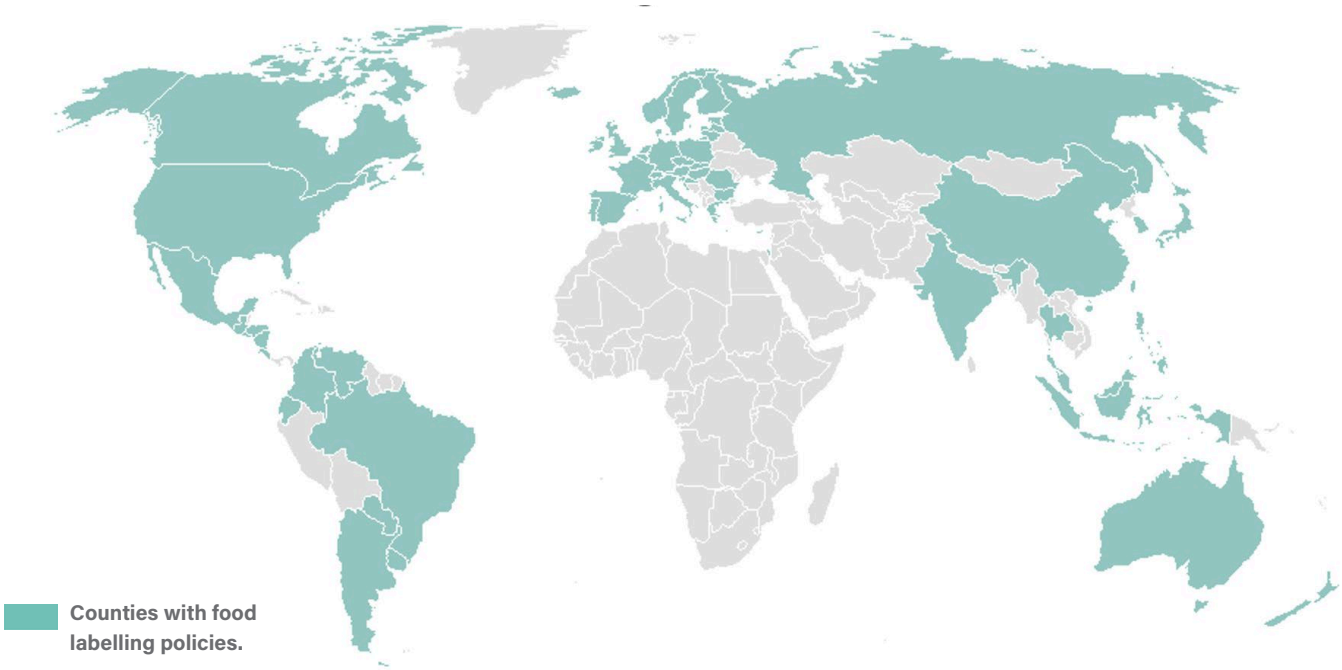
Best practices for companies facing regulatory pressures involve proactive engagement with policymakers, transparent reformulation efforts, and investment in sustainable, health-conscious product lines.

Companies that embrace these approaches not only mitigate regulatory risks but also strengthen consumer trust and align with the growing demand for healthier food options.

Nutritional labelling

Front-of-package labelling has emerged as a crucial tool for promoting healthier dietary behaviours and addressing the global burden of non-communicable diseases,[104] and is strongly advocated for by the WHO.[105] By providing clear, visible information on the nutritional profile of food products, front-of-package labelling aims to nudge consumers toward healthier choices while exerting pressure on manufacturers to reformulate products with improved nutritional profiles.[106]

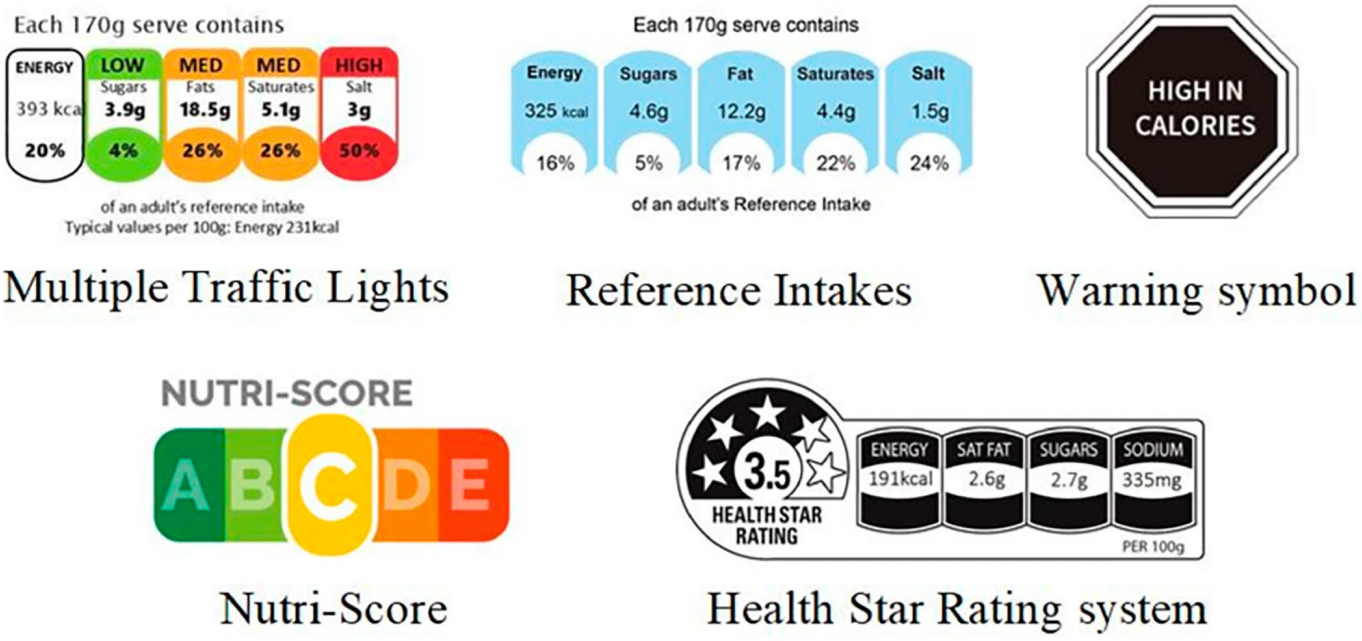
Figure 11: Geographic analysis of food labelling policies. (Source: World Cancer Research Institute.[96] Analysis by Planet Tracker).



Front-of-package labelling systems generally fall into two categories: interpretive and noninterpretive. Interpretive systems use symbols, figures, or cautionary text to indicate the healthiness or nutrient content of a product.[107] Examples include Nutri-Score labels, Chilean-style warning labels, Health Star Ratings (used in Australia and New Zealand), and the "traffic light" labelling system in the United Kingdom (Figure 12).

The traffic light labelling system, for instance, employs a red (high), amber (medium), or green (low) colour scheme to convey levels of total fat, saturated fat, sugars, and salt, making it easier for consumers to make quick, informed decisions at the point of purchase.[106] Noninterpretive systems, such as the Guideline Daily Amount, rely on numeric representations of nutritional content, leaving consumers to interpret the data themselves. While both approaches aim to inform, interpretive systems are often seen as more accessible and effective in driving behavioural change.[106]

Figure 12: Different Front of Package labelling categories



According to the World Cancer Research Fund, 68 countries have implemented interpretive front-of-package labelling systems, demonstrating its growing acceptance as a policy tool.[96] Among these, 10 countries have adopted mandatory warning labels to alert consumers to high levels of harmful ingredients like saturated fats or sugars, and four countries have introduced mandatory colour-coded labelling systems.[96] While mandatory back-of-pack nutrition tables remain a minimum standard in many countries, the increasing prevalence of front-of-package labelling reflects a recognition of its potential to mitigate the healthcare burden associated with poor diets. By making nutritional information more visible and actionable, front-of-package labelling can help consumers make more informed decisions based on their health.

Food label lobbying represents a significant barrier to the widespread implementation of effective front-of-package labelling systems. Food and beverage companies often engage in lobbying efforts to influence government regulations surrounding food labelling, particularly those highlighting unhealthy ingredients such as excess sugar, fat, or salt.[108] These companies frequently argue that such labels could mislead consumers or harm the brand's image. Lobbying efforts may include funding campaigns to delay or weaken the introduction of stringent labelling laws, such as mandatory "front-of-pack" warning labels indicating high-fat, high-sugar, or high-salt content. Trade associations, legal experts, and industry groups often lead these efforts, using both public campaigns and direct engagement with lawmakers to shape policy discussions.[109] The goal of food label lobbying is typically to delay or dilute regulations that could impact company sales or marketability, ultimately stalling progress toward more transparent and effective food labelling.[108]

Corporate responses and best practices

In response to regulatory and policy pressures surrounding front-of-package labelling, food and beverage companies have adopted various strategies to navigate compliance while maintaining brand appeal. Many manufacturers have proactively reformulated their products to achieve more favourable ratings under labelling systems like Nutri-Score or the UK's traffic light labels. For instance, some companies have reduced sugar, salt, and saturated fat content to avoid warning labels that may deter health-conscious consumers.[110]

Beyond reformulation, some companies have embraced voluntary labelling schemes, using them as a marketing tool to highlight healthier product lines and differentiate themselves in the competitive food market. For instance, the Health Star Rating (HSR) system in Australia and New Zealand, introduced in 2014, allows companies to display a star rating on their products, indicating nutritional quality. This voluntary scheme has seen uptake from major retailers and manufacturers aiming to showcase the healthiness of their offerings.[111] A study published in *Nutrients* found that 28% of eligible products displayed the HSR logo. Notably, more than three-quarters (76.4%) of these products had a rating of 3.0 stars or higher, suggesting that companies are selectively using the HSR to promote their healthier products.[112]

Amid these evolving regulations, best practices for companies involve embracing transparency, proactively reformulating products to align with public health goals, and leveraging front-of-package labelling to build consumer trust. Those that adapt to labelling regulations rather than resist them can strengthen their reputation, meet the growing demand for healthier choices, and gain a competitive advantage in markets where clear nutritional information is increasingly valued.

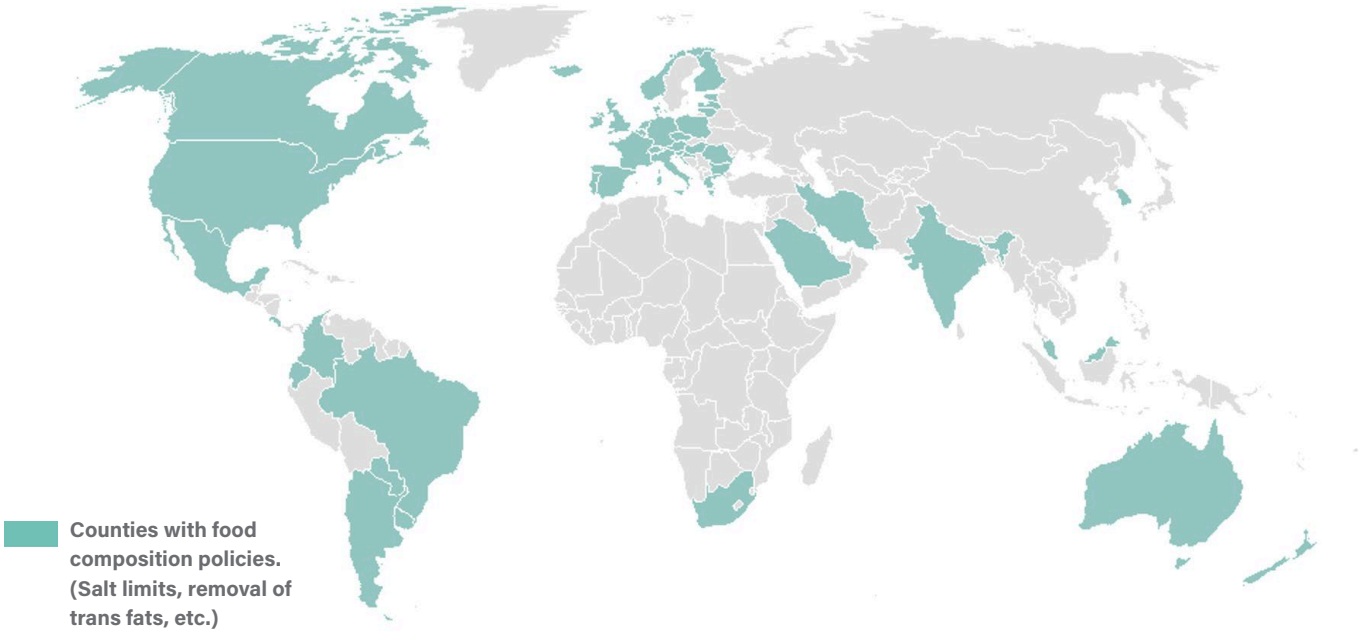
Reformulation

Food and drink reformulation is an essential tool for promoting healthier diets and improving public health outcomes. Many diets, particularly in high-income countries, are characterized by excessive intake of saturated fat, free sugars, salt, and calories, alongside insufficient consumption of fruits, vegetables, and fibre,[113] as outlined in the first section of this report. These dietary imbalances are linked to a range of serious health conditions, including dental cavities, cardiovascular disease, type 2 diabetes, and some cancers. Reformulation strategies aim to improve the nutritional profile of food and drink products, making them healthier without requiring consumers to actively change their eating habits.[112] This approach is widely supported by public health stakeholders, including the WHO and national public health agencies in countries like the UK.[112]

According to the World Cancer Research Centre, 39 countries have implemented some form of food and drink reformulation strategy.[96] However, upon closer examination, half of these initiatives were found to be voluntary rather than mandatory. The UK's Sugar Reduction Programme is a notable example of a voluntary reformulation effort. Launched in 2016, as part of a wider strategy to tackle childhood obesity, the programme challenged the food industry—including retailers, manufacturers, and the out-of-home sector (e.g., restaurants and cafes)—to reduce sugar content by 20% in products contributing most to children's sugar intake. The initiative set an interim target of a 5% reduction in the first year. Despite these ambitious goals, by 2019 the average reduction in sugar levels was only 3%, far below the programme's expectations.[114]

This shortfall underscores the limitations of voluntary reformulation initiatives. Without mandatory requirements, progress is often slow and inconsistent, as businesses face little obligation to meet reformulation targets.[113] This situation highlights the need for mandatory reformulation policies to create a "level playing field" for the food industry and ensure measurable progress toward public health goals. Regulatory reformulation strategies have the potential to provide a more robust framework for reducing harmful dietary components and addressing the global burden of diet-related diseases.[112]

Figure 13: Geographic analysis of Food Composition Policies. (Source: World Cancer Research Institute. [96] Analysis by Planet Tracker).



Salt limits

Reducing salt intake is a key public health strategy for lowering blood pressure and reducing the risk of cardiovascular disease and mortality.[115] Observational studies have consistently demonstrated a strong link between high salt consumption and increased blood pressure, a major risk factor for cardiovascular disease. Recognising this, the UK Scientific Advisory Committee on Nutrition (SACN) recommended in 2003 that the average salt intake for adults be reduced from 9.5 grams to no more than 6 grams per day. Achieving this target is critical for mitigating the global health burden associated with high salt consumption.[116]

Globally, salt reformulation policies have been implemented in 13 countries. These initiatives typically focus on encouraging or requiring manufacturers to reduce the salt content in processed/ultra-processed foods, which are a major source of dietary sodium.[96] For example, the UK has undertaken a series of salt reduction programs since 2006, aiming to gradually lower salt intake across the population. Between 2005 and 2014, these efforts resulted in an estimated 11% reduction in the salt intake of adults in England on average.[117] The program's success in its early years has been attributed to frequent assessments and public reporting on industry progress, which created accountability and maintained pressure on food manufacturers to meet reduction targets.[116]

However, the UK program has been voluntary, and its success has relied heavily on industry cooperation and transparent monitoring. While voluntary measures can achieve progress, they often lack the consistency and enforceability of mandatory policies.[118] The early achievements of the UK's salt reduction programs demonstrate the potential of these initiatives, but they also highlight the need for stronger regulatory frameworks to sustain and amplify the benefits of salt reformulation efforts. Mandatory policies could provide the accountability and standardization required to achieve broader, more lasting reductions in salt intake, ultimately improving population health outcomes.[117]

Reduction of saturated fats

Reducing saturated fat intake is a critical strategy for improving cardiovascular health, as excessive consumption contributes to elevated cholesterol levels, a significant risk factor for heart disease.[119] In the UK, saturated fats account for 12.8% of adults' diets, which exceeds the recommended level of 11%.[120] However, a 2019 report by the UK Scientific Advisory Committee on Nutrition on Saturated Fats and Health recommended that the government implement strategies to reduce the population's average saturated fat intake to less than 10% of total daily calorie intake.[121]

Globally, several countries have adopted policies to regulate and limit the levels of harmful fats in food products.[96] A prominent example is the EU's regulation on trans fats, implemented in 2019. This policy mandates that trans fats, excluding those naturally occurring in animal-derived products, must not exceed 2 grams per 100 grams of fat in food intended for consumers or retail supply. The regulation came into force in April 2021, providing a uniform standard across EU member states to limit the use of industrially produced trans fats.[122]

Such mandatory measures play a vital role in addressing dietary health risks by ensuring that harmful fats are reduced at the source, eliminating the need for individual consumers to make complex dietary adjustments. Policies like the EU regulation can serve as models for other countries aiming to reduce the prevalence of cardiovascular disease and other health conditions linked to high saturated and trans-fat consumption. As highlighted in the previous subsection, while voluntary initiatives can also contribute, mandatory regulations provide the consistency and enforceability needed to achieve widespread improvements in public health.

Corporate responses and best practices

In response to increasing regulatory and policy pressures around food composition, food and beverage companies have taken a range of approaches to comply with reformulation initiatives while balancing consumer preferences and business interests. Some manufacturers have proactively reduced levels of sugar, salt, and saturated fat in their products, particularly in response to voluntary programs like the UK's Sugar Reduction Programme and salt reduction initiatives.[123] [124] Reformulating products to align with public health recommendations allows companies to position themselves as responsible industry leaders while appealing to health-conscious consumers.

However, some firms have opposed mandatory reformulation policies, arguing that rigid targets could limit innovation, increase production costs, or negatively impact product taste and consumer demand. Industry lobbying efforts have at times delayed the introduction of stricter regulations or influenced the design of reformulation targets to be less stringent.[125]

Despite these challenges, best practices in the industry involve proactive engagement with policymakers, transparent reporting on reformulation progress, and investment in research and development to create healthier product alternatives without compromising consumer appeal. Companies that anticipate and adapt to regulatory shifts, rather than resisting them, can enhance brand reputation, meet evolving consumer expectations, and gain a competitive advantage in markets increasingly driven by health-conscious purchasing decisions.[126] As mandatory policies continue to emerge, businesses that integrate reformulation into their long-term strategies will be better positioned to navigate regulatory changes while contributing to public health improvements.

Restrictions on placement

Restricting the placement of unhealthy foods and beverages in shops and other retail environments is an emerging regulatory strategy to influence consumer behaviour and promote healthier diets. Evidence suggests that the strategic positioning of unhealthy products, such as at supermarket checkouts or aisle ends, can encourage impulse purchases and increased consumption.[127] To counteract this, in October 2022, the UK Government introduced restrictions on the placement of unhealthy foods, high in fat, sugar, or salt in prominent locations within supermarkets. By removing these products from high-visibility areas, the policy aims to reduce impulse buying and nudge consumers toward healthier choices.[128]

In addition to placement restrictions, the UK Government has proposed further measures to limit price promotions of unhealthy foods, such as "buy-one-get-one-free" (BOGOF) offers. These promotional tactics have been shown to disproportionately incentivize the purchase of high fat, sugar and salt products, contributing to unhealthy dietary patterns.[129]

Although these policies are a step forward, their limited global uptake highlights an opportunity for other countries to adopt similar strategies.

> *Restricting the placement and promotion of unhealthy foods can play a significant role in reshaping food environments and supporting healthier consumer choices.*[130]

However, for maximum impact, such measures may need to be paired with broader interventions, such as improved labelling, reformulation efforts, and educational campaigns, to comprehensively address the factors driving unhealthy diets.

Marketing restrictions

Existing regulation

Existing regulations targeting the marketing of unhealthy foods to children pose significant challenges for companies and investors in the food and beverage industry. Policies such as Chile's Food Advertising Law, implemented in 2016, are widely regarded as one of the most praised and strongest policies of their kind, prohibiting the promotion of foods high in calories, sugar, sodium, or saturated fat to children under 14 years old. These restrictions apply across various media platforms, including children's television programs, severely limiting the reach of unhealthy food marketing in Chile.[131] Similarly, Mexico has introduced strong marketing restrictions. In 2014, the Mexican Ministry of Health issued an order restricting the advertising of unhealthy food and sweetened beverages during certain hours on television.[132] Further regulations came into effect in 2018, banning cartoon mascots from food packaging to reduce the appeal of unhealthy foods to children.[133]

> *For companies, these regulations could reduce the profitability of high-fat, sugar, and salt products, as they limit the ability to market such products to a key consumer demographic—children.*

Additionally, compliance with these laws often requires significant investments in product reformulation to reduce unhealthy ingredients and meet regulatory standards. Companies may also need to diversify their product portfolios by introducing healthier options, which can incur additional research and development costs.

For investors, these regulatory frameworks represent a potential risk, as they may lead to reduced sales and increased operating expenses for companies that heavily rely on high fat, sugar, and salt products. As more countries adopt similar regulations, the financial implications for companies and investors are likely to grow, emphasizing the need for forward-thinking strategies to adapt to a changing regulatory landscape.

Upcoming regulation

Upcoming regulations highlight the increasing scrutiny of marketing practices for ultra-processed foods, posing additional risks for companies and investors. A notable example is the UK's impending ban on high-fat, sugar and salt food advertising before the watershed, which restricts the promotion of unhealthy food products on television before 9:00 PM. This policy signals that regulators are taking the public health risks associated with ultra-processed foods seriously, and similar measures are likely to follow in other countries. This initiative aims to reduce children's exposure to unhealthy food advertising, thereby addressing concerns about childhood obesity.[134]

For companies, these emerging regulations represent a systemic threat to traditional marketing strategies that heavily rely on reaching younger audiences during prime advertising slots. These restrictions may reduce the visibility and market appeal of high-fat, sugar, and salt products, leading to diminished revenue streams for companies dependent on these items.[135] For investors, the tightening regulatory environment amplifies the risk of decreased profitability, requiring companies to shift toward healthier product offerings and adapt their advertising approaches. The expansion of such policies globally underscores the need for strategic planning to mitigate the financial impact of these regulatory shifts.

Reputational risk

The targeted marketing of unhealthy foods to vulnerable groups, such as children and marginalised communities, carries significant reputational risks for food and beverage companies, as seen in the previous case study. These practices often draw criticism from public health professionals, governmental bodies, and advocacy groups, who highlight the ethical concerns and public health consequences of such strategies.

Negative publicity around targeted marketing practices can also spur regulatory changes that could impact a company's profitability. For instance, widespread criticism of marketing tactics has contributed to stricter advertising regulations in multiple countries, increasing operational costs by requiring companies to reformulate products to meet new nutritional standards, redesign packaging to comply with advertising restrictions, and develop alternative marketing strategies that adhere to the updated regulations. These changes often necessitate significant investments in research and development, marketing redesign, and compliance monitoring, all of which add to a company's operating expenses.[132] [131] [133]

Mandatory business reporting

Supermarkets and the hospitality sector wield considerable influence over consumer behaviour, employing a variety of strategies such as layout changes, promotional tactics, product reformulation, packaging modifications, and selective use of purchasing power to nudge consumers toward certain products. While many food retailers and hospitality businesses express a willingness to contribute to public health goals, the effectiveness of voluntary measures often hinges on monitoring and public accountability. To ensure meaningful progress, there is a strong case for imposing a statutory duty on large food companies to publish annual reports on a standardized set of metrics.[136]

The National Food Strategy: The Plan (2021), is a comprehensive report that outlines recommendations for improving the UK's food system and was developed to address challenges such as improving public health, and reducing food insecurity. It suggests the following metrics could be used:

- **Sales of food and drinks high in fat, sugar, or salt.**
- **Sales of proteins by type (meat, dairy, fish, plant-based, or alternative proteins) and origin.**
- **Sales of vegetables and fruit.**
- **Sales of major nutrients, including fibre, saturated fat, sugar, and salt.**
- **Food waste.**
- **Total food and drink sales.**

However, these recommendations were never formally adopted by the UK government, and there have been no significant new policy initiatives to implement the strategy since its release. While some elements, such as discussions on food labelling and reformulation, continue to be part of broader public health debates, there has been little progress in translating the strategy's key proposals into actionable policies.

Such reporting requirements would not be likely to impose a significant burden on businesses, as many are already obligated to calculate calorie content for their products, meaning the raw data necessary for these metrics is likely already available.[135] Public disclosure of this information would allow investors, governments, and consumers to track industry progress toward healthier practices. Furthermore, it would enhance transparency and accountability, maintaining public pressure on businesses to align their practices with public health and sustainability goals.[135]

Similarly, in 2022, the EU adopted the Corporate Sustainability Reporting Directive (CSRD) which requires large companies to disclose and audit data on their impacts on people, the planet, and sustainability risks.[135]

Under The European Sustainability Reporting Standards (ESRS) S4 (Consumers and End Users), developed under the CSRD,[f] large food companies are required to disclose key information related to product safety, nutritional content, and marketing practices. This includes transparency on ingredient composition, allergen risks, and compliance with food safety regulations, ensuring consumers have access to reliable information about the products they purchase. Additionally, companies must report on nutritional labelling, the presence of high-fat, sugar, and salt ingredients, and any efforts to reformulate products for improved health outcomes.

The standard also mandates disclosure of marketing and advertising strategies, particularly regarding their impact on vulnerable groups, such as children and low-income consumers. This ensures accountability in promotional tactics, preventing misleading claims and encouraging responsible marketing aligned with public health goals. By enforcing these reporting requirements, ESRS S4 pushes food companies toward greater transparency, fostering a more informed consumer base and promoting healthier, more sustainable dietary choices.[137]

However, these recommendations have yet to be implemented, leaving a significant gap in accountability. Enforcing mandatory reporting would not only enable better scrutiny of corporate practices but also incentivize meaningful action to foster healthier and more sustainable food systems.[135]

In addition to initiatives in the UK and EU, mandatory food sector reporting in other large economies remains limited, with regulations in the United States, Australia, and Japan focusing predominantly on food safety and nutritional labelling rather than comprehensive health metrics.[138] In the United States, the Nutrition Labelling and Education Act requires nutritional information on packaged foods,[139] but it does not extend to broader disclosures—leaving many companies to rely on voluntary frameworks like the Sustainability Accounting Standards Board[140] or Global Reporting Initiative,[141] which are not specifically tailored to capture data on unhealthy food sales, product reformulation, or food waste.[142]

Similarly, Australia's regulatory framework under Food Standards Australia New Zealand (FSANZ) ensures food safety and accurate labelling yet lacks a statutory mandate for detailed reporting on sales of high fat, sugar, or salt products and other health-related metrics.[143] In Japan, mandatory reporting is similarly confined to compliance with food safety and nutritional labelling laws, resulting in inconsistent disclosures of key performance indicators such as revenue from unhealthy foods or levels of food waste.

While there is no universal requirement for food producers and retailers to disclose detailed metrics on these areas, some companies voluntarily report on aspects of food waste, product reformulation, and public health commitments as part of their ESG strategies. Many multinational food corporations and supermarkets provide sustainability and health-related data through various reporting frameworks. However, as these reporting standards are voluntary, companies take different approaches to the type and extent of information they disclose. This variation in reporting highlights an opportunity to establish more standardised metrics, which could enhance transparency, comparability, and alignment with broader public health and sustainability goals. Since many businesses already collect relevant data for internal assessments or voluntary reporting, implementing standardised disclosures could offer a structured approach without imposing significant additional burdens, while also supporting informed decision-making for consumers, investors, and policymakers.

f Due to the recent Omnibus proposals, there is a degree of uncertainty as to whether these recommendations will be implemented in their current form.

Global trends and effectiveness

The global adoption of food policies targeting healthier dietary habits has been varied, with some measures gaining widespread traction while others remain underutilised. Policies such as sugar taxes and front-of-package labelling have seen broader implementation, with over 100 countries adopting sugar-sweetened beverage taxes[92] and nearly 70 countries implementing interpretive front-of-package labelling systems.[96]

The effectiveness of these policies often hinges on their ability to complement one another. For instance, sugar taxes can be reinforced by front-of-package labelling to both disincentivise the consumption of unhealthy foods and provide clearer nutritional information to consumers.[144] Without an integrated approach, isolated policies risk being undermined by loopholes or limited scope.

A key determinant of policy success lies in whether measures are voluntary or mandatory.

Voluntary initiatives, such as the UK's sugar reduction program, have achieved some progress, but their impact is often inconsistent and falls short of targets due to limited industry compliance.[117] In contrast, mandatory measures, such as the EU's regulation on trans fats, have proven more effective in achieving uniform outcomes by holding all industry players to the same standard. Mandatory policies also provide greater accountability and transparency, ensuring measurable progress toward public health goals.[121]

However, the adoption of mandatory policies can face resistance from the food industry companies - as highlighted by examples of lobbying in this section - and require robust regulatory frameworks to be enforced. To address these challenges, a phased approach that starts with voluntary initiatives and transitions to mandatory measures can be an effective strategy.[145] Such an approach allows for initial collaboration with industry stakeholders while building the infrastructure and public support necessary for enforcement. Ultimately, a combination of voluntary and mandatory policies, designed to address different facets of the food system, is essential for creating sustainable improvements in global dietary patterns.

Antimicrobial resistance policy and regulation

Regulation is one of the main drivers influencing the amount of antibiotic use in animals and humans.[146] Many countries around the world, particularly in Europe, have made significant efforts to reduce inappropriate antibiotic in food-producing animals, via a range of stewardship interventions including regulation.

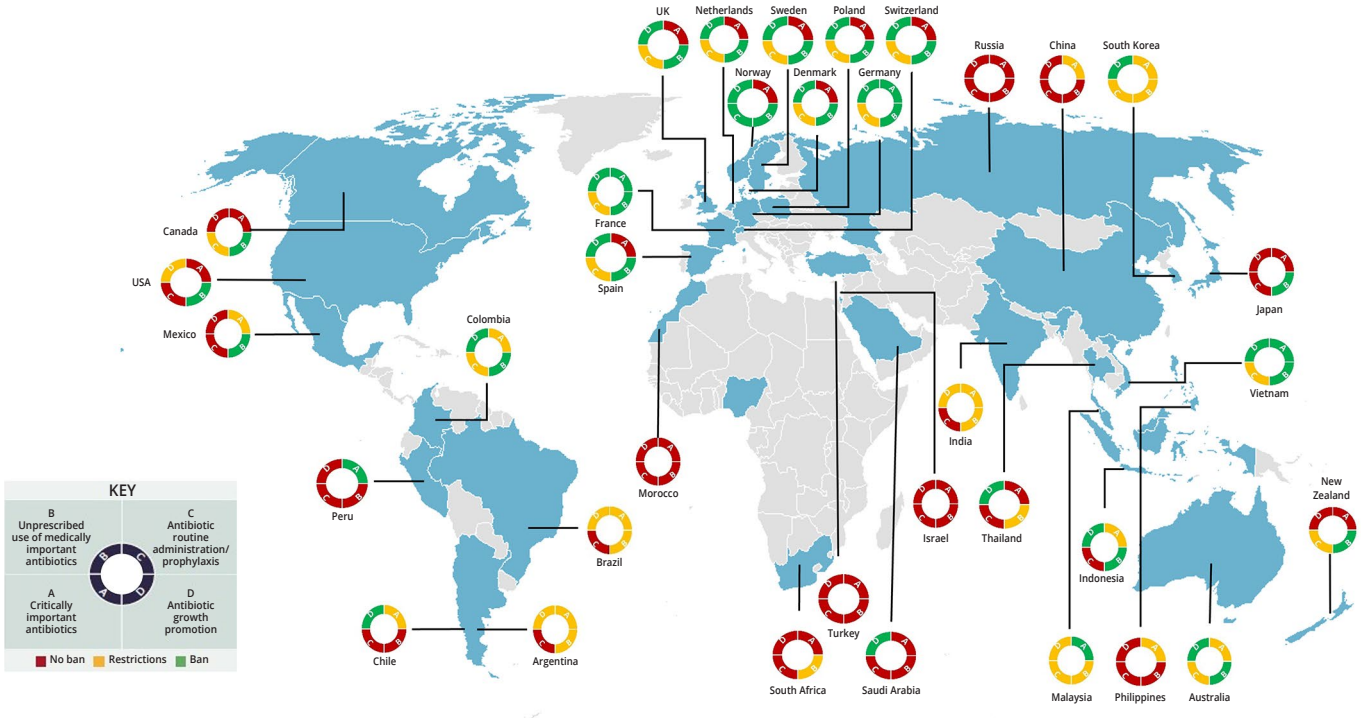
In 2017, the WHO, FAO and World Organization for Animal Health released a global action plan for combating antimicrobial resistance by reducing unnecessary antibiotic use in humans and animals.[147] This action plan is based on a "One Health" model: a "collaborative, multisectoral, and transdisciplinary 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." It recommends reducing overall antibiotic use in food-producing animals by restricting the use of antimicrobials solely to medical use, which is limited to the treatment, control and where appropriate, prevention of infectious diseases.

In line with this, key best practice regulation aims to ensure that:

- **antibiotics can only be prescribed by a veterinarian or animal health expert;**
- **the prophylactic use of antibiotics is banned;**
- **the use of antibiotics as growth enhancers is banned;**
- **the use of high priority antibiotics (those considered highly or critically important for humans as per WHO guidance) is banned and;**
- **limits to the number of antibiotic treatments that can be administered in the lifecycle of animals.**

In addition, the global action plan for tackling antimicrobial resistance recommends policy interventions and community communication programs that raise awareness of the issue and support behaviour change that target audiences in human and animal health and agricultural practices.

Figure 14: Global regulation on antibiotics. (Source: FAIRR Initiative, 2019 [148])



Global trends and effectiveness of antimicrobial use policy

Most regulation related to tackling antimicrobial resistance is focused on animal production, the area of the food system that contributes most significantly to drug resistance, and is more advanced in curbing the inappropriate use of antibiotics in livestock than in aquaculture.[149] High-income and high-middle income countries overall have stronger regulations, with Europe leading in across the board and countries such as Germany, Switzerland, France and Norway demonstrating some of the strongest regulation globally.[150]

One of the most regulated areas for antibiotic use in food production are bans or restrictions on the use of antibiotics for growth promotion in animals, which is one of the biggest drivers of antimicrobial resistance in livestock. The most recent analysis from the World Organisation on Animal Health in 2022 found that 89 countries have legislation or regulation on the use of antimicrobial growth promoters in animals, with 71 countries banning their use entirely.[151]

The EU banned the use of antibiotics as growth promoters in animal feed in 2005,[152] while the US enacted a similar ban in 2017.[153] China, the world's largest meat producer has increased restrictions on certain classes of antibiotic growth promoters in recent years,[154] which has driven a significant decrease in their use,[155] although the country has not yet developed a full ban and remains one of the biggest producers and users of antibiotics globally. Similarly, Brazil, another of the world's biggest meat producers, has phased out many antibiotic-based growth promotors in livestock production, but is yet to enact a comprehensive ban on this practice.[156] Japan's National Action Plan on Antimicrobial Resistance aims to reduce the use of antibiotics in the livestock sector by 15% from 2020 – 2027 and states that the use of antibiotics that could negatively affect human medicine cannot be added to feed for growth promotion.[157]

Another significant area of regulation is the unprescribed use of medically important antibiotics, which is banned in the US, Canada, Mexico, Japan and the EU among others. Regulatory bans and restrictions

on the routine use of antimicrobials in animals for disease prevention (prophylaxis) are less common but growing. Most significantly, the EU introduced a ban on this use of antibiotics in 2022,[158] but the rest of the world lags behind in this area.

Banning and restricting the use of high priority antibiotics (those considered highly or critically important for humans as per WHO guidance) is the least well developed area of regulation globally. Only a few countries, such as Germany and France have developed such regulation,[148] despite the significant risk that the misuse of these antibiotics presents to human health.

Generally, countries that have introduced the above regulatory bans and restrictions on antimicrobial use have seen a reduction in antimicrobial use in animals. In the EU, the world's most well-regulated market, the use of antibiotics in livestock and aquaculture decreased by around 28% from 2018 – 2022 according to the latest data from the European Environment Agency.[159] While there are still significant gaps in regulation and reporting on the use of antimicrobials in animals globally, most markets are seeing an increase in regulation in this area, which could have a significant impact on food system companies.

The rise in regulations on the use of antibiotics in food-producing animals poses a range of financial risks to food producers, manufacturers, retailers and restaurants. This includes, increasing cost of compliance for reducing and monitoring antimicrobial use in the food supply chain, and fines and loss of operating licences where companies fail to comply.

Companies may also face export restrictions for non-compliance with regulation on antimicrobial content in food products. For example, food regulators in the EU, Japan and the US, three of the world's biggest shrimp importers, see a large number of shrimp shipments rejected due to the presence of banned antibiotics particularly with imports from India and Vietnam, some of the biggest shrimp exporters.[160]

Investor engagement guide on health risks and adaptation across the food system

The intersection of food and health presents critical challenges for companies, investors, and policymakers alike. The food sector plays a decisive role in shaping public health outcomes, from addressing rising obesity rates and malnutrition to tackling the growing threat of antimicrobial resistance. As global health concerns intensify and regulatory scrutiny increases, investors need clear and structured engagement strategies to assess how well food companies are adapting to these risks and seizing opportunities for responsible business growth.

This section provides tailored guidance for investors on engaging with food sector companies regarding key health-related risks and opportunities. It outlines best practices for corporate disclosure and accountability, helping investors evaluate how companies are mitigating health risks while aligning with evolving consumer preferences, regulatory requirements, and societal expectations.

To provide a comprehensive framework for investor engagement, we have identified six key themes that highlight essential areas of concern regarding health and nutrition:

Key themes	Description
Pricing and affordability	Examines whether companies are making healthier foods more accessible and affordable, particularly for low-income consumers. Focuses on how pricing strategies support equitable access to better nutrition.
Sales and targets	Assesses whether companies set and report on measurable targets to increase the sales of healthier products, promoting transparency and accountability in their health and nutrition commitments.
Marketing and advertising	Explores how companies influence consumer behaviour through advertising, particularly whether they prioritize healthy foods and limit unhealthy food marketing, especially to children.
Product reformulation and innovation	Looks at how companies improve the nutritional profile of their products through reformulation and innovation, ensuring that healthier options are embedded across product lines.
Governance and strategy	Evaluates whether nutrition and health are embedded into corporate strategy and governance structures, reflecting leadership commitment to public health and long-term business sustainability.
Risk management	Focuses on how companies identify, assess, and manage risks related to health, particularly in connection with ultra-processed foods, shifting consumer preferences, and evolving regulations.

Each theme is accompanied by targeted questions designed to assess a company's commitment, transparency, and progress in promoting healthier food environments.

In addition, this section explores the critical issue of antimicrobial resistance in the food system.

> *The overuse and misuse of antibiotics in livestock and aquaculture have profound implications for public health and food safety.*

Investors have a vital role in encouraging stronger policies on antibiotic stewardship, ensuring that companies implement measurable commitments to reduce antibiotic use and improve supply chain transparency.

By addressing these health-related risks, companies can build resilience, safeguard long-term business sustainability, and contribute to improved public health outcomes. This framework equips investors with the tools needed to engage effectively, driving meaningful change in corporate health strategies across the food system.

Health and nutrition

Pricing and affordability

This theme examines whether companies are making healthy foods accessible to a broad range of consumers, especially those with low incomes. Pricing is a major barrier to healthier food choices, particularly in vulnerable communities. For companies committed to health, their pricing strategies must align with their stated objectives.

Key questions:

1. **Do you leverage price promotions to encourage the consumption of healthy foods over unhealthy alternatives?**

   Why it matters: Price promotions are a powerful tool to influence consumer behaviour, especially for price-sensitive, low-income households. By making healthier options financially attractive, companies can address health inequities and encourage better dietary choices.

2. **Do you conduct pricing analyses to ensure your healthier products are appropriately priced and accessible to low-income households?**

   Why it matters: Healthier options are often perceived as premium products. Pricing analyses can help companies identify and address this perception, ensuring their products are accessible to a wider audience.

3. **Have you made specific policy or public commitments to improve the affordability of healthier options relative to less healthy alternatives?**

   Why it matters: Public commitments signal accountability and prioritization of health equity. They help build trust among stakeholders and demonstrate a company's dedication to improving access to healthier products.

Sales and targets

This theme explores whether companies set measurable goals to increase sales of healthier products and transparently report progress. Measurable targets and transparency are crucial for driving change and ensuring accountability.

Key questions:

1 **Do you set proportional targets for increasing sales of healthier products, and do you disclose data on the proportion of sales attributed to these products?**

Why it matters: Targets create a framework for action, enabling companies to focus efforts and allocate resources strategically. Transparency in sales data builds trust and ensures alignment with global health goals.

2 **Are you actively measuring and reporting the health profile of your product portfolio?**

Why it matters: Regular assessments allow companies to evaluate and improve the nutritional quality of their products, align with public health goals, and foster transparency with stakeholders.

Marketing and advertising

Marketing strongly influences consumer preferences, especially among children. This theme examines whether companies responsibly promote healthier options and restrict advertising of unhealthy products, particularly to younger audiences.

Key questions:

1 **Does your company have a policy to prioritize marketing spend on healthy foods, while restricting the advertising of unhealthy foods to children?**

Why it matters: Unethical advertising to children contributes to long-term health challenges like childhood obesity. Responsible marketing protects public health, builds trust, and aligns with corporate social responsibility.

2 **How do you ensure transparency in your product labelling to enable consumers to make informed decisions about their health?**

Why it matters: Transparent labelling empowers consumers to choose healthier options and helps companies stay ahead of regulatory requirements.

Product reformulation and innovation

This theme evaluates how companies improve the nutritional quality of their products through reformulation and innovation. Embedding health improvements into widely consumed products ensures healthier options become the default choice, requiring minimal behavioural changes from consumers.

Key questions:

1. **Have you set and publicly disclosed reformulation targets aimed at improving the nutritional quality of your products?**

   Why it matters: Reformulation drives systemic change by embedding healthier options directly into the food supply. Public targets add transparency and accountability.

2. **What measurable benchmarks are in place for reducing sugar, salt, and unhealthy fats across your portfolio?**

   Why it matters: Clear benchmarks enable companies to demonstrate their progress and commitment to addressing public health concerns like obesity and non-communicable diseases.

Governance and strategy

Strong governance ensures health and nutrition are integrated into a company's core strategy. Leadership prioritisation at the board level signals a commitment to long-term business success, societal impact, and investor expectations.

Key questions:

1. **Does your company's strategy include a clear and comprehensive nutrition policy?**

   Why it matters: A comprehensive policy ensures that nutrition goals are treated as strategic priorities, driving systemic change and aligning with corporate objectives.

2. **How do you balance profitability with the responsibility of promoting healthier eating habits?**

   Why it matters: Companies that integrate health into their core strategy can achieve sustainable growth, open new markets, and enhance their reputation as leaders in addressing global health challenges.

Risks and accountability

This theme explores how companies manage regulatory, reputational, and market risks associated with health, particularly concerning ultra-processed foods.

Key questions:

1. **How are you addressing potential risks associated with ultra-processed foods, such as regulatory and reputational challenges, as well as shifts in consumer preferences toward healthier options?**

   Why it matters: Failure to address these risks could result in regulatory penalties, reputational damage, and market share losses as consumers increasingly demand healthier options.

2. **To what extent is your company exposed to the risks associated with ultra-processed foods (UPFs)?**

   Why it matters: Transparency around exposure to UPF-related risks helps investors evaluate a company's preparedness to navigate challenges and adapt to emerging health trends.

These six themes and accompanying questions provide investors with a structured framework for assessing food companies' approaches to health and nutrition.

By addressing these issues, companies can improve public health outcomes, mitigate risks, and capture growth opportunities in an increasingly health-conscious market.

Antimicrobial resistance

Investors play a key role in transforming current systems of livestock and antibiotic production that perpetuate the overuse and misuse of antibiotics. This section identifies key questions that investors can use to engage with companies to tackle antimicrobial resistance in the food system. These questions aim to assess whether companies have developed policies and strategies around antibiotic stewardship in their own operations and supply chains, the scope of these policies and how well they are being implemented.

Antimicrobial resistance policy quality:

These questions aim to assess whether companies acknowledge their role in addressing antimicrobial resistance and limiting the use of antibiotics in their own operations and their meat, dairy and aquaculture supply chains through robust policies and/or strategies.

Key questions:

1 Do you have a publicly disclosed policy/strategy on antibiotic stewardship?

Why it matters: Publicly disclosing a policy or strategy on antibiotic stewardship is a key indicator that a company recognises the impact that the overuse and misuse of antimicrobial drugs in farmed animals has on antimicrobial resistance. The FAIRR Initiative (a collaborative investor network that raises awareness of the material risks and opportunities in the global food sector) has coordinated an investor coalition engaging 20 large global companies (13 US-based and 7 UK-based) from the fast food and casual dining sector on antimicrobial resistance. The coalition saw an increase in antibiotic stewardship policies with 17 companies had publicly disclosed policies on antibiotic use in 2019, up from one in 2016.

2 Does the policy/strategy cover animal-derived protein sources across:

a. all relevant species?

b. all operations?

Why it matters: A comprehensive policy/strategy will cover all animal products and all company operations. Firms may increase the coverage of their policy/strategy to full coverage over time, in which case starting with the most material operating markets and animal products is likely to be the most efficient way to start managing antibiotic use.

3 Does the policy ban:

a. The use of WHO-defined medically important antibiotics for growth promotion?

b. Any use of critically important or highest priority critically important antibiotics?

c. Any use of WHO-defined medically important antibiotics?

d. The routine use of any antibiotics (for growth promotion and disease prevention/ prophylaxis) with antibiotics only used when there is a disease present and administered by a veterinarian?

Why it matters: Companies banning livestock farming and aquaculture's use of antimicrobial medicines which are medically important for use in humans can reduce the risk of transmitting drug resistant disease to people. Bans on the routine use of any antibiotics for growth promotion and disease prevention is key to reducing antibiotic use and tackling antimicrobial resistance. This can mitigate economic risks to businesses, including increased veterinary costs and productivity lost from antimicrobial resistance as well as restrictions, bans, fines and loss of licence to operate from failing to comply with regulation.

FAIRR has found that US-based fast food and casual dining companies it engaged with were moving beyond FDA guidance which advises against the use of medically important antibiotics for growth promotion purposes only to stop all routine use of antibiotics to prevent disease in healthy animals.

Antimicrobial policy implementation

Once companies have set up a policy and/or strategy on antibiotic policy, it is important to understand whether companies are implementing these. The following questions aim to understand companies' level of transparency on implementation, including disclosing antibiotic use and auditing.

1 Does the policy/strategy commit to specific, measurable, timebound targets or timelines for all relevant animal species that you produce or source?

Why it matters: To effectively monitor progress on tackling antibiotic misuse and the use of medically and critically important antibiotics, companies need to set specific, measurable, timebound targets to phase out practices that contribute to antimicrobial resistance within a company's own operations and supply chains. To be effective, these should be publicly disclosed targets or timelines that comply with regulation at a minimum and aim to cover all relevant animal species that a company produces or sources, in line with Question 2 above.

2 Do you disclose the quantities of antibiotics used (mg antibiotic/kg meat), separating out WHO-defined medically important antibiotics?

Why it matters: To effectively monitor progress and ensure accountability on tackling antibiotic misuse, regular annual reporting on the intensity of antibiotic use (e.g. mg of antibiotics per kg of animal weight) is needed. Companies may begin by disclosing the % of animals treated with antibiotics. Reporting should separate out WHO-defined medically important antibiotics and separate out the reasons for antibiotic use (e.g. for growth promotion, disease prevention, or to treat disease with veterinary approval).

3 Where non-compliance with the policy is identified, do you state what action(s) have been taken to remedy this?

Why it matters: It is important for companies to monitor supply compliance with their policies on antibiotic use to effectively tackle antimicrobial resistance within their supply chains. Ideally companies should identify where suppliers have failed to comply with the company's policy and specify the action taken to remedy this.

4 Do you commit to and/or carry out third-party auditing and monitoring of antibiotic use across all operations and the whole supply chain?

Why it matters: Independent auditing and monitoring of antibiotic use across a company's operations and supply chains provides external verification and validation of compliance with a company's policy and progress towards tackling practices that contribute to antimicrobial resistance. Companies may work with independent third party auditors to monitor their own operations or supply chains, or should ensure that supplies have third party audits in place.

References

1 World Obesity Federation. (2024). World Obesity Atlas 2024.

2 Giles, L. C., & Brimblecombe, J. K. (2023). Seeking sweetness: A systematic scoping review of factors influencing sugar-sweetened beverage consumption in remote Indigenous communities worldwide. Beverages, **9(1),** 11. https://doi.org/10.3390/beverages9010011

3 Murray, C. J. L., et al. (2022) "Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis." The lancet 399, no. 10325, 629-655.

4 IHME, Global Burden of Disease (2024) – with minor processing by Our World in Data. "Age-standardized deaths from all causes attributed to high body-mass index per 100,000 people" [dataset]. IHME, Global Burden of Disease, "Global Burden of Disease - Risk Factors".

5 OECD (2019). The Heavy Burden of Obesity. Available at: https://www.oecd.org/en/publications/the-heavy-burden-of-obesity_67450d67-en/full-report.htm

l6 Rudd Center for Food Policy & Health. (2021). FACTS 2021: Food Advertising to Children and Teens Score. Retrieved from https://media.ruddcenter.uconn.edu/wp-content/uploads/sites/2909/2024/06/FACTS2021.pdf

7 WHO (2024). Obesity and overweight. Available at: https://www.who.int/en/news-room/fact-sheets/detail/obesity-and-overweight

8 WHO (2024) Malnutrition. Available at: https://www.who.int/news-room/fact-sheets/detail/malnutrition

9 Kopp, Wolfgang. "How western diet and lifestyle drive the pandemic of obesity and civilization diseases." Diabetes, metabolic syndrome and obesity: targets and therapy (2019): 2221-2236.

10 Lane, M. M., et al. (2024) Ultra-processed food exposure and adverse health outcomes: umbrella review of epidemiological meta-analyses. BMJ. 384. Available at: https://www.bmj.com/content/**384**/bmj-2023-077310?utm

11 GBD 2019 Risk factors Collaborators. (2020) Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. **396.** 1223-1249.

12 Stephenson, J. et al (2021). The association between obesity and quality of life: a retrospective analysis of a large-scale population-based cohort study. BMC Public Health. 21. Available at: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-021-12009-8

13 Stratton, R. et al. (2018) Managing malnutrition to improve lives and save money. British Association for parenteral and enteral nutrition. Available at: https://www.bapen.org.uk/pdfs/reports/mag/managing-malnutrition.pdf

14 WHO (2021). Obesity. Available at: https://www.who.int/news-room/facts-in-pictures/detail/6-facts-on-obesity

15 WHO (2022) Non-communicable diseases. Geneva, Switzerland. Available at: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

16 World Obesity Federation. (2024). World Obesity Atlas 2024. https://data.worldobesity.org/publications/?cat=22

17 Goryakin, Y., & Suhrcke, M. (2014) Economic development, urbanization, technological change and overweight: What do we learn from 244 Demographic and Health Surveys? Economics & Human Biology. **14.** 109-127

18 Hawkes, C. (2006) Uneven dietary development: linking the policies and processes of globalization with the nutrition transition, obesity and diet-related chronic diseases. Globalization and Health. **2.** Available at: https://globalizationandhealth.biomedcentral.com/articles/10.1186/1744-8603-2-4

19 The Kings Fund (2024) Illustrating the relationship between poverty and NHS services. Available at: https://www.kingsfund.org.uk/insight-and-analysis/long-reads/relationship-poverty-nhs-services

20 Ministry of Health, Labour and Welfare. (2021). Summary of the report of the committee meeting on the promotion of a healthy and sustainable food environment. Retrieved from https://www.mhlw.go.jp/content/10900000/000836945.pdf

21 World Health Organization - Global Health Observatory (2024) – processed by Our World in Data.

22 Sahoo, K. et al. (2015) Childhood obesity: causes and consequences. Journal of Family Medicine and primary care. **4(2),** 187-192.

23 United Nations Children's Fund (UNICEF), World Health Organization (WHO), International Bank for Reconstruction and Development/The World Bank. Levels and trends in child malnutrition: UNICEF / WHO / World Bank Group Joint Child Malnutrition Estimates: Key findings of the 2023 edition. Available at: https://iris.who.int/bitstream/handle/10665/368038/9789240073791-eng.pdf?sequence=1

24 World Obesity Federation (2023a) World Obesity Atlas 2023. https://data.worldobesity.org/publications/?cat=19

25 NCD Risk Factor Collaboration, (2017). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. The Lancet. **390(10113),** 2627-2642.

26 World Obesity Federation (2022). The Economic Impact of Overweight & Obesity 2nd Edition with Estimates for 161 Countries. Available at: https://data.worldobesity.org/publications/WOF-Economic-Impacts-2-V2.pdf

27 Monteiro, C.A. et al (2018) The UN Decade of Nutrition, the NOVA food classification and the trouble with ultra-processing. Public Health and Nutrition. **21(1),** 5-17. https://doi.org/10.1017/S1368980017000234

28 Monteiro, C.A., et al. (2010). A new classification of foods based on the extent and purpose of food processing. Cadernos de Saúde Pública, 26(11):2039-2049.

29 Martini, D., et al. (2021) Ultra-Processed Foods and Nutritional Dietary Profile: A Meta-Analysis of Nationally Representative Samples. Nutrients, **13,** 3390. https://doi.org/10.3390/nu13103390

30 Navajo Nation Division of Health. (2014). Navajo Nation Behavioral Risk Factor Surveillance System (BRFSS) report: Final report. https://nec.navajo-nsn.gov/Portals/0/Projects%20Webpage/Navajo%20Health%20Survey%20Webpage/NN_BRFSS_Report_Final.pdf

31 WHO (2024) The inequality epidemic: low-income teens face higher risks of obesity, inactivity and poor diet. Available at: https://www.who.int/europe/news-room/23-05-2024-the-inequality-epidemic--low-income-teens-face-higher-risks-of-obesity--inactivity-and-poor-diet#:~:text=The%20prevalence%20of%20overweight%20and,%25%20of%20their%20wealthier%20peers).

32 Steele, E. M. et al. (2017) The Share of ultra-processed foods and the overall nutritional quality of diets in the US: evidence from a nationally representative cross-sectional study. Population Health Metrics. **15(1).** Steele, E. M. et al. (2017) The Share of ultra-processed foods and the overall nutritional quality of diets in the US: evidence from a nationally representative cross-sectional study. Population Health Metrics. 15(1).

33 Rauber, F. et al. (2018) Ultra-Processed Food Consumption and Chronic Non-Communicable Diseases-Related Dietary Nutrient Profile in the UK (2008–2014). Nutrients. **10(5).** 587.

34 Moubarac, J. C. et al, (2017) Consumption of ultra-processed foods predicts diet quality in Canada. Appetite. **108.** 512-520.

35 Baker, P. & Friel, S., (2016) Food systems transformations, ultra-processed food markets and the nutrition transition in Asia.

36 Adams J, et al. (2020) Public health response to ultra-processed food and drinks BMJ; 369. Available at: https://www.bmj.com/content/369/bmj.m2391?utm

37 Van Boeckel, Thomas P., Emma E. Glennon, Dora Chen, Marius Gilbert, Timothy P. Robinson, Bryan T. Grenfell, Simon A. Levin, Sebastian Bonhoeffer, and Ramanan Laxminarayan. "Reducing antimicrobial use in food animals." Science 357, no. 6358 (2017): 1350-1352. https://www.science.org/doi/full/10.1126/science.aao1495

38 Samtiya, Mrinal, Karl R. Matthews, Tejpal Dhewa, and Anil Kumar Puniya. "Antimicrobial resistance in the food chain: trends, mechanisms, pathways, and possible regulation strategies." Foods 11, no. 19 (2022): 2966.

39 Tiseo, Katie, Laura Huber, Marius Gilbert, Timothy P. Robinson, and Thomas P. Van Boeckel. "Global trends in antimicrobial use in food animals from 2017 to 2030." Antibiotics 9, no. 12 (2020): 918. https://www.mdpi.com/2079-6382/9/12/918

40 World Health Organization. "Food safety." World Health Organization. October 4, 2024. Accessed October, 2024, https://www.who.int/news-room/fact-sheets/detail/food-safety

41 EFSA Panel on Biological Hazards (BIOHAZ). "Scientific Opinion on the risk posed by pathogens in food of non-animal origin. Part 1 (outbreak data analysis and risk ranking of food/pathogen combinations)." EFSA Journal 11, no. 1 (2013): 3025.

42 Patel, Sameer J., Matthew Wellington, Rohan M. Shah, and Matthew J. Ferreira. "Antibiotic stewardship in food-producing animals: challenges, progress, and opportunities." Clinical therapeutics 42, no. 9 (2020): 1649-1658.

43 World Organisation for Animal Health. Forecasting the Fallout from AMR: Economic Impacts of Antimicrobial Resistance in Food-Producing Animals. 2024. Accessed October 2024. https://www.woah.org/en/document/forecasting-the-fallout-from-amr-economic-impacts-of-antimicrobial-resistance-in-food-producing-animals/

44 Samtiya, Mrinal, Karl R. Matthews, Tejpal Dhewa, and Anil Kumar Puniya. "Antimicrobial resistance in the food chain: trends, mechanisms, pathways, and possible regulation strategies." Foods 11, no. 19 (2022): 2966.

45 World Organisation for Animal Health. Annual Report of Antimicrobial Agents Intended for Use in Animals: 8th Report. 2024. Accessed October 2024. https://www.woah.org/app/uploads/2024/05/woah-amu-report-2024-final.pdf

46 Manyi-Loh, Christy, Sampson Mamphweli, Edson Meyer, and Anthony Okoh. "Antibiotic use in agriculture and its consequential resistance in environmental sources: potential public health implications." Molecules 23, no. 4 (2018): 795.

47 World Organisation for Animal Health. (2024). Annual report on antimicrobial agents intended for use in animals: 8th report. https://www.woah.org/app/uploads/2024/05/woah-amu-report-2024-final.pdf

48 O'Neill, Jim. "Tackling drug-resistant infections globally: final report and recommendations." (2016). https://amr-review.org/

49 Center for Global Development. "Drug-Resistant Infections Are One of the World's Biggest Killers, Especially for Children in Poorer Countries. We Need to Act Now." Center for Global Development. January 20, 2022. Accessed October 9, 2024, https://www.cgdev.org/blog/drug-resistant-infections-are-one-worlds-biggest-killers-especially-children-poorer-countries

50 Naghavi, Mohsen, Stein Emil Vollset, Kevin S. Ikuta, Lucien R. Swetschinski, Authia P. Gray, Eve E. Wool, Gisela Robles Aguilar et al. "Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with forecasts to 2050." The Lancet 404, no. 10459 (2024): 1199-1226.

51 Jonas, Olga B., Alec Irwin, Franck Berthe, Francois G. Le Gall and Patricio V. Marquez. 2017. "Drug-Resistant Infections: A Threat to Our Economic Future (Vol. 2): Final Report." HNP/Agriculture Global Antimicrobial Resistance Initiative. Washington, D.C.: World Bank Group. https://www.worldbank.org/en/topic/health/publication/drug-resistant-infections-a-threat-to-our-economic-future

52 World Bank. "By 2050, drug-resistant infections could cause global economic damage on par with 2008 financial crisis." World Bank. September 20, 2016. Accessed October 2024. https://www.worldbank.org/en/news/press-release/2016/09/18/by-2050-drug-resistant-infections-could-cause-global-economic-damage-on-par-with-2008-financial-crisis#:~:text=NEW%20YORK%2C%20September%2019%2C%202016,Our%20Economic%20Future.%E2%80%9D%20The%20research

53

54 MSCI Sustainability Institute, FAIRR, Investor Action on AMR. Health & Wealth: An Investor's Guide to Antimicrobial Resistance. 2024. Accessed October 2024. https://www.fairr.org/resources/reports/health-and-wealth-the-investors-guide-to-antimicrobial-resistance

MSCI Sustainability Institute, Investor Action on AMR, & FAIRR Initiative. (2024). Health & Wealth: The investors' guide to antimicrobial resistance (AMR), a growing global health crisis. https://www.fairr.org/resources/reports/health-and-wealth-the-investors-guide-to-antimicrobial-resistanceThrough Her Lens+4

55 Center for Science in the Public Interest. (2019). Changing the channels: How big media helps big food target kids (and what to do about it). Retrieved from https://www.cspinet.org/sites/default/files/attachment/CSPI_Changing_Channels_Report_2019.pdf

56 Ofcom. (2022). Children and parents: Media use and attitudes report 2022. https://www.ofcom.org.uk/__data/assets/pdf_file/0024/234609/children-and-parents-media-use-and-attitudes-report-2022.pdf

57 Fleming - Milici, F. et al. (2023) Prevalence of food and beverage brands in "made-for-kids" child-influencer YouTube videos: 2019–2020. Pediatric Obesity.

58 Potvin Kent, Monique; Pauzé, Elise; Roy, Elisabeth-Anne; de Billy, Nicholas; Czoli, Christine . (2019). Children and adolescents' exposure to food and beverage marketing in social media apps. Pediatric Obesity, (), e12508–.

59 Oberlo. (2024). Influencer marketing market size (2016–2024). https://www.oberlo.com/statistics/influencer-marketing-market-size

60 Australian Association of National Advertisers. (2020). YouTube prohibits all food and beverage ads next to children's content. Retrieved from https://aana.com.au/youtube-prohibits-all-food-and-beverage-ads-next-to-childrens-content/

61 UK Government. (n.d.). Junk food ad ban legislation progresses to curb childhood obesity. Retrieved January 9, 2025, from https://www.gov.uk/government/news/junk-food-ad-ban-legislation-progresses-to-curb-childhood-obesity

62 Phys.org. (2023). Food and beverage brands still common in child influencer videos despite bans on ads. Retrieved from https://phys.org/news/2023-02-food-beverage-brands-common-child-influencer.html

63 Zhou, M. et al. (2019) Mapping the Celebrity Endorsement of Branded Food and Beverage Products and Marketing Campaigns in the United States, 1990–2017. Int. J. Environ. Res. Public Health. 16(19) 3743.

64 Bragg, M. A.; Miller, A. N.; Elizee, J.; Dighe, S.; Elbel, B. D. . (2016). Popular Music Celebrity Endorsements in Food and Nonalcoholic Beverage Marketing. PEDIATRICS, 138(1).

65 Smith, J., Jones, A., & Brown, R. (2022). The influence of celebrity and social media influencer endorsements on children's consumption of high-fat, sugar, and salt (HFSS) products: A systematic review. Nutrients, 14(3), 434. https://doi.org/10.3390/nu14030434

66 Grier, S. A. (2009, June). African American and Hispanic youth vulnerability to target marketing: Implications for understanding the effects of digital marketing. American University Research Archive.

67 Harris, J. L., Fleming-Milici, F., Mancini, S., Kumanyika, S., & Ramirez, A. G. (2022). Targeted food and beverage advertising to Black and Hispanic consumers: 2022 update. Rudd Center for Food Policy & Health, University of Connecticut.

68 Harris, J.L. (2020) Targeted Food Marketing to Black and Hispanic Consumers: The Tobacco Playbook. 110(3), 271-272. AM J Public Health.

69 Institute of Medicine. (2006). Food marketing to children and youth: Threat or opportunity? National Academies Press. https://doi.org/10.17226/11514

70 Union of Concerned Scientists. (2016). The relationship between race, income, and the prevalence of diabetes: A national and neighborhood-level analysis. Union of Concerned Scientists. https://www.ucsusa.org/sites/default/files/attach/2016/04/ucs-race-income-diabetes-2016.pdf

71 Francisco S, Foley D, Antone-Nez R, Kinlacheeny JB, Yazzie D. Report of the Navajo Behavioral Risk Factor Surveillance Survey. 2017. Navajo Epidemiology Center, Navajo Department of Health, The Navajo Nation. Accessed November 15, 2024. https://www.nec.navajo-nsn.gov/Portals/0/Projects%20Webpage/Navajo%20Health%20Survey%

72 Segrest, V., & Krohn, E. (2018). Native infusion: Rethink your drink – A guide to ancestral beverages. Northwest Portland Area Indian Health Board. https://www.npaihb.org/wp-content/uploads/2018/02/NativeInfusion.pdf

73 Notah Begay III Foundation. (2017, February 8). Ideas, examples to reduce sugary drinks among Native American children at first Healthy Beverage Summit. https://nb3foundation.org/2017/02/08/ideas-examples-to-reduce-sugary-drinks-among-native-american-children-at-first-healthy-beverage-summit-february-8-2017/

74 Metrakos, N. (2022, September 28). Less sugar, more choices. Coca-Cola Europe. https://www.coca-cola.com/eu/en/media-center/less-sugar-more-choices

75 Navajo Nation Division of Health. (2014). Taxed junk foods: Healthy Diné Nation Act of 2014. https://nec.navajo-nsn.gov/Portals/0/Projects%20Webpage/HDNA%20Webpage/HDNA_TaxedFoods.pdf

76 de Paula Matos, J., Rodrigues, M. B., Duarte, C. K., & Horta, P. M. (2023). A scoping review of observational studies on food and beverage advertising on social media: A public health perspective. International Journal of Environmental Research and Public Health, 20(4), 3615. https://doi.org/10.3390/ijerph20043615

77 Hall, K. D., et al. (2019). Ultra-processed diets cause excess calorie intake and weight gain: An inpatient randomized controlled trial of ad libitum food intake. Cell Metabolism, 30(1), 67–77.e3. https://doi.org/10.1016/j.cmet.2019.05.008

78 Norman J. et al. (2019) Remember Me? Exposure to Unfamiliar Food Brands in Television Advertising and Online Advergames Drives Children's Brand Recognition, Attitudes, and Desire to Eat Foods: A Secondary Analysis from a Crossover Experimental-Control Study with Randomization at the Group Level. Journal of the academy of nutrition and dietetics. 120, 120-129

79 Rajagopal, N. A. (2020). Childhood memories affecting brand loyalty and consumption behavior among adult consumers. International Journal of Business Innovation and Research, 23(1), 1-15. https://doi.org/10.1504/IJBIR.2020.110975

80 Japanese Law Translation. (2013). Act on Control and Improvement of Amusement Business, etc. (Act No. 122 of 1948). Ministry of Justice, Japan. Accessed February 14, 2025. https://www.japaneselawtranslation.go.jp/en/laws/view/3649/en

81 Pineda, E. et al. (2024) Review: Effectiveness and policy implications of health taxes on foods high in fat, salt, and sugar. Food Policy. **123.** https://doi.org/10.1016/j.foodpol.2024.102599

82 American Heart Association. (2016). Sugar-sweetened beverage taxation: Position statement. https://www.heart.org/-/media/files/about-us/policy-research/policy-positions/access-to-healthy-food/sugary-beverages/sugar-sweetened-beverage-taxation-ucm_490766.pdf

83 World Bank. Sugar-sweetened beverage tax hub. Retrieved November 13, 2024, https://ssbtax.worldbank.org/

84 World Bank. (2020). Taxes on sugar-sweetened beverages: International evidence and experiences. https://openknowledge.worldbank.org/handle/10986/33969

85 Colchero, M. A., Popkin, B. M., Rivera, J. A., & Ng, S. W. (2016). Beverage purchases from stores in Mexico under the excise tax on sugar sweetened beverages: Observational study. BMJ, 352, h6704. https://doi.org/10.1136/bmj.h6704

86 Rogers, N. T., et al. (2020). Anticipatory changes in British household purchases of soft drinks associated with the announcement of the Soft Drinks Industry Levy: A controlled interrupted time series analysis. PLOS Medicine, 17(11), e1003269. https://doi.org/10.1371/journal.pmed.1003269

87 Institute for Government. "Sugar tax." Institute for Government. Accessed January 23, 2025. https://www.instituteforgovernment.org.uk/explainer/sugar-tax

88 National Institute for Health and Care Research. (2020, February 12). Sugar levels in UK soft drinks lowered following government levy. https://www.nihr.ac.uk/news/sugar-levels-uk-soft-drinks-lowered-following-government-levy

89 Tselengidis, A., & Östergren, P. O. (2018). Lobbying against sugar taxation in the European Union: Analysing the lobbying arguments and tactics of stakeholders in the food and drink industries. Scandinavian Journal of Public Health, 46(5), 565–575. https://doi.org/10.1177/1403494818787102

90 Mariath, A. B., & Martins, A. P. B. (2022). Sugary drinks taxation: Industry's lobbying strategies, practices and arguments in the Brazilian legislature. Public Health Nutrition, 25(1), 170–179. https://doi.org/10.1017/S136898002100149X

91 Hofman, K. (2018). Sugar-sweetened beverage taxes: Industry response and tactics. The Yale Journal of Biology and Medicine, 91(2), 185–190.

92 Mayor, S. (2016). Industry funded studies are less likely to link sugary drinks to obesity, review finds. BMJ, 355, i5852. https://doi.org/10.1136/bmj.i5852

93 World Bank. (2020). Taxes on sugar-sweetened beverages: International evidence and experiences. World Bank Group. https://openknowledge.worldbank.org/server/api/core/bitstreams/4ca4b739-f713-5a89-aca2-02ec50976e7c/content

94 Penney, T. et al. (2023) Reactions of industry and associated organisations to the announcement of the UK Soft Drinks Industry Levy: longitudinal thematic analysis of UK media articles, 2016-18. BMC Public Health.

95 Institute of Economic Affairs. "Sin taxes can cost poor families up to ten times more than they cost the wealthy." Institute of Economic Affairs. Published November 28, 2016. Accessed January 23, 2025. https://iea.org.uk/media/sin-taxes-can-cost-poor-families-up-to-ten-times-more-than-they-cost-the-wealthy/

96 Institute of Economic Affairs. (2016). The proof of the pudding: Denmark's fat tax fiasco as a warning to others. https://iea.org.uk/wp-content/uploads/2016/07/The%20Proof%20of%20the%20Pudding.pdf

97 World Cancer Research Fund International. (n.d.). NOURISHING policy database: Level one policies. Retrieved November 10, 2024, from https://policydatabase.wcrf.org/level_one?page=nourishing-level-one

98 Ethiopian Government. (2020). Excise Tax Proclamation No. 1186/2020. https://ethiodata.et/wp-content/uploads/2023/01/Ethiopia-Excise-Tax-proclamation-No.-1186_2020.pdf

99 World Health Organisation. (2024). Fiscal policies to promote healthy diets: WHO guideline. https://iris.who.int/bitstream/handle/10665/376763/9789240091016-eng.pdf?sequence=1

100 FAO, IFAD, UNICEF, WFP and WHO. 2022. The State of Food Security and Nutrition in the World 2022. Repurposing food and agricultural policies to make healthy diets more affordable. Rome, FAO. https://doi.org/10.4060/cc0639en

101 Springmann, M., & Freund, F. (2022). Options for reforming agricultural subsidies from health, climate, and economic perspectives. Nature Communications, 13, Article 82. https://doi.org/10.1038/s41467-021-27645-2

102 Springmann, M., Spajic, L., Clark, M. A., Poore, J., Herforth, A., Webb, P., ... & Willett, W. (2019). The healthiness and sustainability of national and global food-based dietary guidelines: Modelling study. BMC Medicine, 17, 93.

103 AG Barr. (2017, October 12). Regular IRN-BRU is reducing its sugar content. https://www.agbarr.co.uk/about-us/news/regular-irn-bru-is-reducing-its-sugar-content/

104 World Health Organization. (n.d.). Nutrition labelling. World Health Organization. Retrieved November 10, 2024, from https://www.who.int/initiatives/food-systems-for-health/nutrition-labelling

105 World Health Organization. (2019). Guiding principles and framework manual for front-of-pack labelling for promoting healthy diet. Retrieved November 10, 2024, Available at: https://www.who.int/news/item/27-09-2021-state-of-play-of-who-guidance-on-front-of-the-pack-labelling

106 World Health Organization. (2021). State of play of WHO guidance on front-of-the-pack labelling. World Health Organization. Retrieved November 10, 2024, Available at: https://www.who.int/news/item/27-09-2021-state-of-play-of-who-guidance-on-front-of-the-pack-labelling

107 UNICEF (2021) Front-of-Pack Nutrition Labelling: A 'How-to' Guide for Countries. Available at: https://www.unicef.org/media/118716/file

108 Lee, C. (2023). How does lobbying impact our food and agricultural policies? FoodUnfolded. https://www.foodunfolded.com/article/how-does-lobbying-impact-our-food-and-agricultural-policies

109 Mialon, M., Gaitan Charry, D. A., Cediel, G., Crosbie, E., Scagliusi, F. B., & Perez Tamayo, E. M. (2021). 'I had never seen so many lobbyists': Food industry political practices during the development of a new nutrition front-of-pack labelling system in Colombia. Public Health Nutrition, 24(9), 2737–2745. https://doi.org/10.1017/S1368980020002268

110 Carolina Population Center. (2020). In response to nutrition warning labels, manufacturers reformulate unhealthy foods. University of North Carolina at Chapel Hill. https://www.cpc.unc.edu/news/in-response-to-nutrition-warning-labels-manufacturers-reformulate-unhealthy-foods/

111 Department of Health and Aged Care. (n.d.). About health stars. Health Star Rating. Retrieved February 24, 2025, from http://www.healthstarrating.gov.au/internet/healthstarrating/publishing.nsf/Content/About-health-stars

112 Taillie, L. S., Busey, E., Stoltze, F. M., & Popkin, B. M. (2019). Governmental policies to reduce unhealthy food marketing to children. Nutrition Reviews, 77(11), 787–816. https://doi.org/10.1093/nutrit/nuz021

113 World Health Organisation (2022) Reformulation of food and beverage products for healthier diets: policy brief. Available at: https://iris.who.int/bitstream/handle/10665/355755/9789240039919-eng.pdf?sequence=1

114 Public Health England. (2020). Sugar reduction: Report on progress between 2015 and 2019 [PDF]. Department of Health and Social Care. Retrieved November 13, 2024, from https://assets.publishing.service.gov.uk/media/60953c63e90e0735727c80be/Sugar_reduction_progress_report_2015_to_2019-1.pdf

115 UK Health Security Agency. (2018). Reducing salt to tackle preventable diseases. UK Health Security Agency Blog. Retrieved November 16, 2024, from https://ukhsa.blog.gov.uk/2018/12/19/reducing-salt-to-tackle-preventable-diseases/

116 Scientific Advisory Committee on Nutrition. (2003). Salt and health [PDF]. The Stationery Office. Retrieved November 15, 2024. Available at: https://assets.publishing.service.gov.uk/media/5a74983de5274a44083b7ef6/SACN_Salt_and_Health_report.pdf

117 Public Health England (2016) National Diet and Nutrition Survey: assessment of dietary sodium Adults (19 to 64 years) in England, 2014. Retrieved November 16, 2024. Available at: https://assets.publishing.service.gov.uk/media/5c4ee269ed915d7d3cdd01a9/Sodium_study_2014_England_Text_final.pdf

118 Action on Salt. (2023). New research confirms the UK's current salt reduction programme is no longer fit for purpose. Action on Salt. Retrieved November 10, 2024. Available at: https://www.actiononsalt.org.uk/news/news/2023/2023-news-section/new-research-confirms-the-uks-current-salt-reduction-programme-is-no-longer-fit-for-purpose-.html

119 National Health Service. Fat: The facts. NHS - Healthier Families. Retrieved November 10, 2024. Available at: https://www.nhs.uk/healthier-families/food-facts/fat/

120 British Nutrition Foundation. Fat. British Nutrition Foundation. Retrieved November 13, 2024. Available at: https://www.nutrition.org.uk/nutritional-information/fat/#:~:text=In%20the%20UK%2C%20saturated%20fats,energy%20recommended%20for%20the%20population.

121 Scientific Advisory Committee on Nutrition. (2019) Saturated fats and health. Retrieved November 12, 2024. Available at: https://assets.publishing.service.gov.uk/media/5d1f88af40f0b609dba90ddc/SACN_report_on_saturated_fat_and_health.pdf

122 European Union. (2019). Regulation (EU) 2019/649: Amending Annex III to Regulation (EC) No 1925/2006 of the European Parliament and of the Council as regards trans fat, other than trans fat naturally occurring in fat of animal origin. EUR-Lex. Retrieved November 13, 2024. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0649

123 Nestlé UK & Ireland. (n.d.). Reducing sugar, salt and saturated fat. Retrieved February 25, 2025, from https://www.nestle.co.uk/en-gb/sustainability/nutrition-health/improving-products/reduce-sugar-salt-fat

124 Neville, S. (2024, October 15). Tate & Lyle's journey from sugar producer to sugar reducer. Financial Times. https://www.ft.com/content/fc066513-1b18-4332-9b55-56939d2ab82a

125 Global Health Advocacy Incubator. (2021, June). Industry Interference in Food Policy (Policy Brief No. 1). https://assets.advocacyincubator.org/uploads/2021/06/Policy-Brief-Industry-Interference.pdf

126 Onyeaka, H., Nwaiwu, O., Obileke, K., Miri, T., & Al-Sharify, Z. T. (2023). Global nutritional challenges of reformulated food: A review. Food Science & Nutrition, 11(6), 2483–2499. https://doi.org/10.1002/fsn3.3286

127 Watt, T. L. S., et al. (2020) Reducing consumption of unhealthy foods and beverages through banning price promotions: what is the evidence and will it work? Cambridge University Press. **23(12).** 2228–2233. https://doi:10.1017/S1368980019004956

128 UK Government. (2022). Promotions of unhealthy foods restricted from October 2022. GOV.UK. Retrieved November 13, 2024. Available at: https://www.gov.uk/government/news/promotions-of-unhealthy-foods-restricted-from-october-2022

129 UK Government. (2022). Restricting promotions of products high in fat, sugar, or salt by location and by volume price: Implementation guidance. GOV.UK. Retrieved November 14, 2024. Available at: https://www.gov.uk/government/publications/restricting-promotions-of-products-high-in-fat-sugar-or-salt-by-location-and-by-volume-price/restricting-promotions-of-products-high-in-fat-sugar-or-salt-by-location-and-by-volume-price-implementation-guidance

130 Muir, S. et al. (2023). UK government's new placement legislation is a 'good first step': a rapid qualitative analysis of consumer, business, enforcement and health stakeholder perspectives. BMC Medicine. **21.**

131 Ministerio de Salud. (2012). Ley Nº 20.606 sobre composición nutricional de los alimentos y su publicidad. Biblioteca del Congreso Nacional de Chile. https://www.bcn.cl/leychile/navegar?idNorma=1041570

132 McNicoll, S. (2016, June 27). Restricting marketing to children in Mexico. Food Secure Canada. https://www2.foodsecurecanada.org/resources-news/news-media/restricting-marketing-children-mexico

133 Martinez, K. (2021, February 23). Cartoon mascots banned from food packaging in Mexico to combat childhood obesity. Remezcla. https://remezcla.com/food/cartoon-mascots-banned-food-packaging-mexico-combat-childhood-obesity/

134 UK Government. (2021, June 24). Junk food ad ban legislation progresses to curb childhood obesity. Gov.uk. https://www.gov.uk/government/news/junk-food-ad-ban-legislation-progresses-to-curb-childhood-obesity

135 Ebiquity. (2024, October 28). 2025 HFSS advertising ban: The impact and essential strategies for UK advertisers. Ebiquity. https://ebiquity.com/news-insights/blog/2025-hfss-advertising-ban/

136 National Food Strategy. (2021) The Plan. Retrieved November 13, 2024. Available at: https://www.nationalfoodstrategy.org/

137 European Union. (2023). Regulation (EU) 2023/2772 of the European Parliament and of the Council of 13 December 2023 on sustainability reporting standards. EUR-Lex. Accessed February 2025, from https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:32023R2772

138 OECD. (2021). Consumer food labelling and public health: A review of policy approaches. Retrieved from https://www.oecd.org/consumer/food-labelling

139 U.S. Food and Drug Administration. (2021). Nutrition facts label – Updates and guidance. Retrieved from https://www.fda.gov/food/nutrition

140 Sustainability Accounting Standards Board. (2020). SASB standards overview for the food & beverage sector. Retrieved from https://www.sasb.org/standards/

141 Global Reporting Initiative. (2021). GRI standards. Retrieved from https://www.globalreporting.org/standards/

142 Food Standards Australia New Zealand. (2020). Food Standards Code. Retrieved from https://www.foodstandards.gov.au/code/Pages/default.aspx

143 Ministry of Health, Labour and Welfare of Japan. Food safety policies in Japan. Retrieved from https://www.mhlw.go.jp/english/topics/foodsafety/fhc/04.html

144 Acton, R.B., et al. (2019) Taxes and front-of-package labels improve the healthiness of beverage and snack purchases: a randomized experimental marketplace. Internation Journal of Behavioural Nutrition and Physical Activity. **16(46).**

145 Popkin, B.N, & Wen Ng, S. (2021) Sugar-sweetened beverage taxes: Lessons to date future of taxation. PLoS Med 18(1). https://doi.org/10.1371/journal.pmed.1003412

146 Da Silva, Rafael Almeida, Nelson Enrique Arenas, Vera Lucia Luiza, Jorge Antonio Zepeda Bermudez, and Sian E. Clarke. "Regulations on the use of antibiotics in livestock production in South America: a comparative literature analysis." Antibiotics 12, no. 8 (2023): 1303.

147 World Health Organization, WHO Guidelines on Use of Medically Important Antimicrobials in Food-Producing Animals, November 2017, Accessed October 20234, https://www.who.int/publications/i/item/9789241550130

148 FAIRR Initiative. (2019). Improving antibiotics stewardship in livestock supply chains: Engagement progress report. https://assets.ctfassets.net/pptrn6r2r6bl/6s1t6rWHGQ1gAAADjwUWAM/659863cece61c74e8ddd17d46fc1094c/FAIRR_antibiotics_progress_17_May.pdf

149 Lulijwa, Ronald, Emmanuel Joseph Rupia, and Andrea C. Alfaro. "Antibiotic use in aquaculture, policies and regulation, health and environmental risks: a review of the top 15 major producers." Reviews in Aquaculture 12, no. 2 (2020): 640-663.

150 FAIRR, Improving antibiotics stewardship in livestock supply chain: Engagement progress report. May 2019. Accessed October 2024. https://www.fairr.org/resources/reports/improving-antibiotics-stewardship-in-livestock-supply-chains

151 World Organisation for Animal Health. Annual Report of Antimicrobial Agents Intended for Use in Animals: 8th Report. 2024. Accessed October 2024. https://www.woah.org/app/uploads/2024/05/woah-amu-report-2024-final.pdf

152 EU Commission, Ban on antibiotics as growth promoters in animal feed enters into effect, December 2005, https://ec.europa.eu/commission/presscorner/detail/en/ip_05_1687

153 US Food and Drug Administration. List of medically important antimicrobial drugs affected by GFI #213. 2021. https://www.fda.gov/animal-veterinary/judicious-use-antimicrobials/list-medically-important-antimicrobial-drugs-affected-gfi-213.

154 Wen, R., Li, C., Zhao, M., Wang, H. and Tang, Y., 2022. Withdrawal of antibiotic growth promoters in China and its impact on the foodborne pathogen Campylobacter coli of swine origin. Frontiers in Microbiology, 13, p.1004725.

155 Zhao, Qi, Zinan Jiang, Ting Li, Min Cheng, Hongyang Sun, Mingquan Cui, Chunping Zhang, Shixin Xu, Hejia Wang, and Congming Wu. "Current status and trends in antimicrobial use in food animals in China, 2018–2020." One Health Advances 1, no. 1 (2023): 29.

156 Da Silva, Rafael Almeida, Nelson Enrique Arenas, Vera Lucia Luiza, Jorge Antonio Zepeda Bermudez, and Sian E. Clarke. "Regulations on the use of antibiotics in livestock production in South America: a comparative literature analysis." Antibiotics 12, no. 8 (2023): 1303.

157 The Government of Japan, "National Action Plan on Antimicrobial Resistance (AMR) 2023–2027", April 2023. https://faolex.fao.org/docs/pdf/jap217404.pdf

158 Simjee, Shabbir, and Gabriella Ippolito. "European regulations on prevention use of antimicrobials from january 2022." Brazilian Journal of Veterinary Medicine 44 (2022).

159 European Environment Agency, "Veterinary antimicrobials in Europe's environment: a One Health perspective", May 2024. https://www.eea.europa.eu/publications/veterinary-antimicrobials-in-europes-environment

160 Southern Shrimp Alliance, "Food Regulatory Authorities in the EU, Japan, and the United States Once Again Confirm that India and Vietnam Continue to Use Banned Antibiotics in their Shrimp Aquaculture", February 2024. https://shrimpalliance.com/food-regulatory-authorities-in-the-eu-japan-and-the-united-states-once-again-confirm-that-india-and-vietnam-continue-to-use-banned-antibiotics-in-their-shrimp-aquaculture/

Important Information

This material is intended for professional investors , sophisticated or wholesale clients or professional or institutional clients (or equivalent) as may be defined in the jurisdiction in which the material is received, including Hong Kong and Singapore and should not be relied upon by other persons. It is made available to you for information purposes only and does not constitute investment or financial advice, an offer of asset management services, a recommendation or an offer or solicitation to buy, hold or sell any security and has not been prepared in connection with any such offer.

This material is neither directed at nor intended to be accessed by persons resident in, or citizens of any country, or types or categories of individual where to allow such access would require any registration, filing, application for any licence or approval or other steps to be taken by First Sentier Investors in order to comply with local laws or regulatory requirements in such country.

This material does not constitute investment research. Accordingly, this information has not been prepared in compliance with the legal provisions promoting independent investment research, and it is not subject to any restriction prohibiting the execution of transactions prior to the dissemination of investment research. Any research in this document has been procured and may have been acted upon by First Sentier Investors for its own purposes.

Reference to specific securities (if any) is included for the purpose of illustration only and should not be construed as a recommendation to buy, sell or hold the same. All securities mentioned herein may or may not form part of the holdings of First Sentier Investors, Mitsubishi UFJ Trust and Banking Corporation ('the Trust Bank') ' or Mitsubishi UFJ Financial Group, Inc. ('MUFG') portfolios at a certain point in time, and the holdings may change over time.

Although the information presented here is from sources believed to be reliable and reputable, neither First Sentier Investors, the Trust Bank nor MUFG make any representation or warranty in relation to the accuracy, completeness or reliability of any information contained here. The information and views expressed are those of the authors and not necessarily those of either First Sentier Investors, the Trust Bank or MUFG. The opinions expressed are subject to change without notice. Reliance upon information in this material is at the sole discretion of the reader. To the extent permitted by law, no liability is accepted by MUFG, First Sentier Investors, nor their affiliates for any loss or damage as a result of any reliance on or use of this material.

This document is the intellectual property of First Sentier Investors, the Trust Bank and if applicable a third party. They retain all intellectual property or other rights in all information and content (including, but not limited to, all text, data, graphics and logos).

References to 'we' or 'us' are references to First Sentier Investors, a global investment management business, the ultimate owner of which is MUFG. First Sentier Investors includes a number of entities in different jurisdictions.

For readers located in the United Kingdom, this document is issued by First Sentier Investors (UK) Funds Limited (First Sentier Investors), authorised and regulated by the Financial Conduct Authority. Registered office: Finsbury Circus House, 15 Finsbury Circus, London EC2M 7EB.

For readers located in the EU, this document is issued by First Sentier Investors (Ireland) Limited (First Sentier Investors), authorised and regulated by the Central Bank of Ireland. Registered office: 70 Sir John Rogerson's Quay, Dublin 2, Ireland number 629188 (CBI registration number C182306)

For readers located in Hong Kong, this document is issued by First Sentier Investors (Hong Kong) Limited and has not been reviewed by the Securities & Futures Commission in Hong Kong. First Sentier Investors, FSSA Investment Managers, Stewart Investors, RQI Investors and Igneo Infrastructure Partners are the business names of First Sentier Investors (Hong Kong) Limited.

For readers located in Singapore, this document is issued by First Sentier Investors (Singapore) whose company registration number is 196900420D. This advertisement or publication has not been reviewed by the Monetary Authority of Singapore. First Sentier Investors (registration number 53236800B), FSSA Investment Managers (registration number 53314080C), Stewart Investors (registration number 53310114W), RQI Investors (registration number 53472532E) and Igneo Infrastructure Partners (registration number 53447928J) are the business divisions of First Sentier Investors (Singapore).

For readers located in Australia, this document is issued by First Sentier Investors (Australia) IM Limited (ABN 89 114 194311 AFSL 289017). This material is intended for persons who are professional, sophisticated or 'wholesale clients' (as defined under the Corporations Act 2001 (Cth) (Corporations Act)) and has not been prepared for and is not intended for persons who are 'retail clients' (as defined under the Corporations Act). This material contains general information only. It is not intended to provide you with financial product advice and does not take into account your objectives, financial situation or needs. Before making an investment decision you should consider, with a financial advisor, whether this information is appropriate in light of your investment needs, objectives and financial situation. Any opinions expressed in this material are the opinions of the author only and are subject to change without notice. Such opinions are not a recommendation to hold, purchase or sell a particular financial product and may not include all of the information needed to make an investment decision in relation to such a financial product.

In the US, this document is issued by First Sentier Investors (US) LLC authorised and regulated by the Securities Exchange Commission (RIA 801-93167).