The cost of food

True cost accounting: panacea or technocratic illusion?

In 2020, an article published on hungerexplained explored the fact that market prices do not reflect the real cost of food nor provide the signals likely to induce decisions that would lead to more sustainability to the economic agents operating within food systems, including consumers [read].

This article also gave thought to the methods used for estimating a price for nonmarket costs and benefits. It expressed doubts on the possibility to come to an agreement on valuation methods to be used, as several approaches are possible that may produce very different results, making comparisons awkward.

It was concerned that, "from an ethical perspective, the blind and uncritical use of these shadow prices also carries the risk of offering to the public a scientised version of the 'all-market ideology' where the market is presented as the universal solution that can fix everything in an optimal way, in other words, a new version of the market deity, adorned with complex computations". It added, quoting T. S. Eliot, that, as often, what probably matters most is the journey (i.e. analysis and understanding what occurs in a food system), not the destination (i.e. resulting computed prices).

Almost six years later and after the publication of a series of studies adopting variants of the True Cost Accounting (TCA) method [read], it was found worth the while to revisit this topic and attempt to learn from the experience accumulated.

What do we mean by cost?

The Oxford Learner's dictionaries' most general definition of 'cost' reads: "the effort, loss or damage that is involved in order to do or achieve something". It is the most general definition provided as it includes all other meanings given by this dictionary[1].

This cost is incurred by spending money (to pay for goods and services), or by experiencing loss of production or damage of a physical or psychological kind.

[1] (1) the amount of money that you need in order to buy, make or do something; (2) the total amount of money that needs to be spent by a business; and (4) the sum of money that somebody is ordered to pay for lawyers, etc. in a legal case [read].

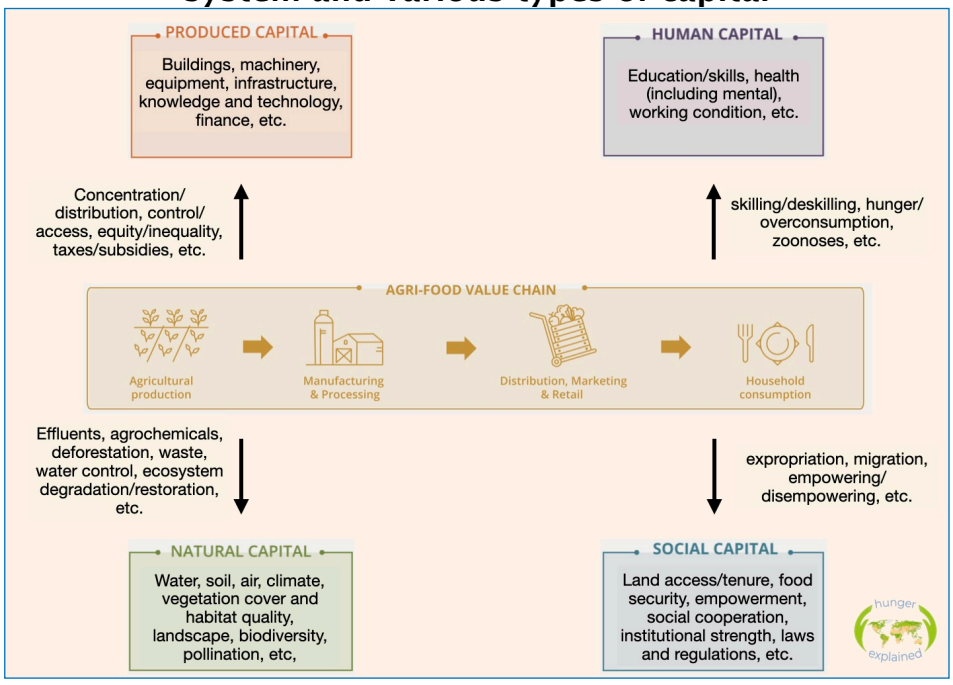
True Cost Accounting of food

In recent years, True Cost Accounting is the method that has gained importance in the area of food by developing a fairly standardised solution for measuring nonmarket costs.

True Cost Accounting (TCA), as defined by FAO in its 2023 State of Food and Agriculture report, is "an approach to uncovering the hidden impacts of our agrifood systems on the environment, health, and livelihoods, so that agrifood systems actors are better informed and prepared before making decisions" [read p. iv]. It also "allows the estimation of the hidden costs generated by market, institutional and policy failures" [read p. xv]. The method of estimation seeks to measure how the impacts produced affect productivity of resources and people and translate into a loss of GDP expressed in monetary value. Earlier studies had been using different approaches [see for example here].

The Operational guidelines for carrying out TCA were developed by the global initiative TEEB (The Economics of Ecosystem and Biodiversity) in 2020 [read], in the wake of earlier work on the evaluation of the true costs of food by Fitzpatrick et al., [read] and the Food and Land Use Coalition, in 2019 [read]. These guidelines define the framework within which the approach should be implemented, considering how activities occurring within food value chains interact with and modify four types of capital: natural, produced, human and social capital (see **figure 1**).

Figure 1 – Costs/benefits resulting from the interaction of an agri-food system and various types of capital



Adapted from TEEB, 2020.

TCA was then promoted by the Scientific Group of the UN Food Systems Summit in 2021 [read here and consult our thematic page on the UNFSS], leading, in 2023, to another attempt at assessing the "True Cost of Food" at world level [read].

Analysis of a few studies on the real cost of food

For the purpose of this paper, 8 studies were selected and reviewed[2]:
- the 2019 report by Fitzpatrick et al. on the UK [read],
- the 2019 study by the Food and Land Use Coalition (FOLU) [read],
- A. Perotti's thesis on Switzerland, in 2020 [read],
- the 2021 study by Barrett et al. on the US [read],
- the work by Hendricks et al., commissioned by the UNFSS Scientific Group, published in 2023 [read],
- the report by FAO on The State of Food and Agriculture in 2023 [read],
- the work by Alliot et al., on France, in 2024 [read in French] that uses a method very different from TCA (see **box 1)**, and
- the thesis by A. Andersson on Sweden, in 2025 [read].

Box 1 - An alternative approach to TCA:
the analysis of the social costs of France's food system

The objective of the study undertaken by Alliot et al., in 2024 [read in French], was to better understand the evolution of the food system, its socioeconomic characteristics and its main social, health-related and environmental impacts.

In the process, the study analysed public expenditure associated to these impacts with the view to contribute to the national debate on public expenditure. This was felt to be particularly relevant as public expenditure was thought to be more reactive than proactive with respect to these impacts.

To start, the study makes an analysis of the history of the food system and its mode of operation seen from the economic point of view. This was aimed at linking impacts to the way the food system functions.

The focus was on identifying **actual social costs** - not externalities that are 'virtual' as in TCA, but costs actually born by payments made by firms, households or the state. In this approach:
social costs = social costs of activities that are not borne by those who implement them, but by other actors, households or the state + the support provided to the actors who implement them.

For the authors, this approach had the double advantage of assessing the **relevance of public expenditures** (does it support activities with negative impacts?) and the **level of social justice** (are some actor's profits generated by activities whose negative impact is borne by others?).

The results show a total estimate of the social costs of the food system of at least USD80 billion per year, of which USD57 billion of public support to the food system and USD23 million of social costs borne by the state. Social costs directly borne by the private sector and households should be added to this total, but they were not estimated.

An advantage of this method, compared to TCA, is that the results obtained **specify which actors actually bear the costs and who generates them,** an information useful for deciding actions to be implemented and rules to be enforced to reduce those impacts and related costs. Another major difference with TCA is that all costs **do not have to be borne ultimately by private actors, including households, but also collectively by the state** in its role of facilitating and orienting the economy.

A possible weakness of this approach is that there is **no clear correspondence between the costs evaluated and current activities**, e.g. the level of overweight and obesity (and related diseases) observed refers to past levels of food consumption, not to the current levels which are likely to have a greater cost in the future, as overweight and obesity have been growing fast historically. A similar caveat could be made for other costs, including those that are linked to the environment. Also, the costs actually borne, which are analysed, are **dependent on the current institutional and policy context**.

[2] This selection includes two 'historical' and global studies (FOLU and Hendricks), FAO's 2023 SOFA which provides results globally and by region and country, and five national studies, one of which - for France - adopts a very different approach from TCA.

Coverage of studies

Table 1 compares the coverage of these studies in terms of the impacts for which costs were assessed.

All the studies consider the impacts on most of the elements described for **natural capital** on figure 1, except for landscape and pollination.

Very little is said, however, on costs related to **produced capital**. Yet, consequences of concentration of capital (both physical and intellectual) in terms of the direction of scientific and technological development, and access to technology, are known to be considerable [read here and here]. They contribute to exacerbate inequalities and related social costs [read]. These damages are overlooked as they are not reflected in the national accounting framework adopted by TCA and do not generate easily identifiable expenditures, in the case of the study on France.

Table 1 – Coverage by the studies reviewed

	Fitzpatrick et al.	FOLU	Switzerland	Barrett et al.	Hendricks et al.	FAO	France	Sweden
Natural capital								
Water	■	■	■	■	■	■	■	■
Soil	■	■	■	■	■	■		■
Air		■	■	■	■	■	■	
Climate	■	■	■	■	■	■	■	■
Vegetation cover and habitat quality		■	■					
Landscape								
Biodiversity	■			■	■	■	■	■
Pollination								
Others		■	■				■	■
Produced capital								
Buildings, machinery, etc.								
Knowledge and technology								
Finance				■				
Others		■						
Human capital								
Education/skills								
Health	■	■	■	■	■	■	■	■
Working condition			■	■			■	
Others			■	■				
Social capital								
Land access/tenure								
Food security		■		■		■		
Poverty		■				■	■	
Empowerment								
Cooperation								
Institutions								
Laws and regulations			■					
Others			■	■				

On **human capital**, the focus, in the studies reviewed, is almost exclusively on health, measured in terms of number of working days and lives lost – with the TCA method, and actual expenditure – in the study on France.

Yet, food systems treat people who work in them quite harshly as can be seen from the large number of suicides [read] and cases of depression in rural areas observed throughout the world, and from the millions of farmers who leave farming, many moving to urban areas [read]. This situation is largely linked to the extraordinarily low level of remuneration of labour in food systems [read here pp. 4-7 and here pp. 4-5]. These damages are not considered, with the exception of the study on the US that takes child and underpaid labour into account.

Finally, on **social capital,** studies examine essentially food insecurity and poverty and their costs, especially in low-income countries, for the FAO study. Little is said, for example, on how access to land (or expropriation) impacts on people or how certain laws and regulations exclude some individuals and serve others for grabbing an outrageous share of profits and power in food systems [read]. These losses and damages are not considered.

Of course, it is not surprising to see that the studies focused their estimates on costs that are relatively easier to estimate, leaving aside others, even when they are important and question the dominant logic that determines the mode of operation of food systems.

As a result the description of the costs of food is at best partial, if not biased. The most visible bias is that those costs that are linked to health are the easiest to quantify: for TCA, in terms of productivity lost, loss in days of work or loss of lives. For environmental costs (already computed studies dating back to 2014 and before [read]), they are derived from available models.

However, these costs (and the issues to which they are related) **might not necessarily be those that matter most when designing a strategy for food for the medium and long term**.

Results

The results obtained are difficult to compare from study to study, even when they refer to the same territory (the world as a whole or a specific country), mainly because their coverage varies. Also, as they refer to different years, and their costs are expressed in different numeraires.

Nevertheless, their values reveal a fairly general pattern. The costs of food not captured by the market are predominantly due to health impacts (from 41 to 85% of estimated hidden or social costs), followed by environmental costs (from 15 to 39%). Other costs appear negligible, largely because they have not been well covered.[3]

The main quantitative results of the study reviewed can be found in **table 2** presented in Annexe.

[3] Another reason for this is that health impacts are born by both farmers and consumers (billions of people), while social costs involve only those who work in the food systems, a much smaller number of people.

The three studies which estimate costs at world level produce similar total estimates for two of them (FOLU and FAO), the third one (Hendricks) shows a much larger figure (+60%) mainly because estimated environmental costs are much higher (more than double than what is estimated in the FAO report).

Health costs dominate (they comprise three main categories: those linked to overweight and obesity, those linked to undernourishment and those related to the exposition to toxic products). There are indications that these costs have recently been growing faster than the other costs [read p. xii].

The FAO study (SOFA 2023) shows huge disparities across regions. This is particularly striking when considering the costs per capita which are the lowest in Africa and the highest in Europe (5 times larger). Explanations to this include a possible underestimation of the cost of undernutrition [read p. xvii] and a much greater cost associated to the industrial food systems[4], particularly health costs (see **figures 2 and 3**).

The hidden costs of food in the regions, according to FAO, 2023

Figure 2 – Total costs per region

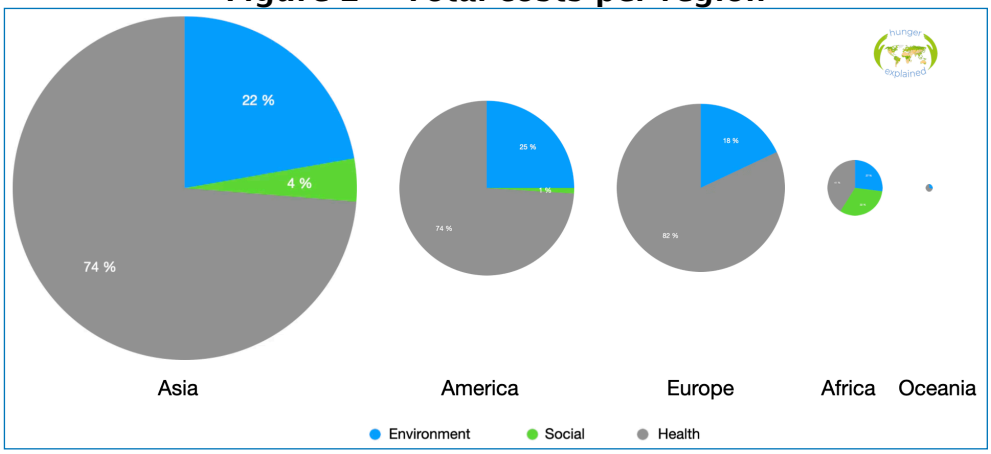
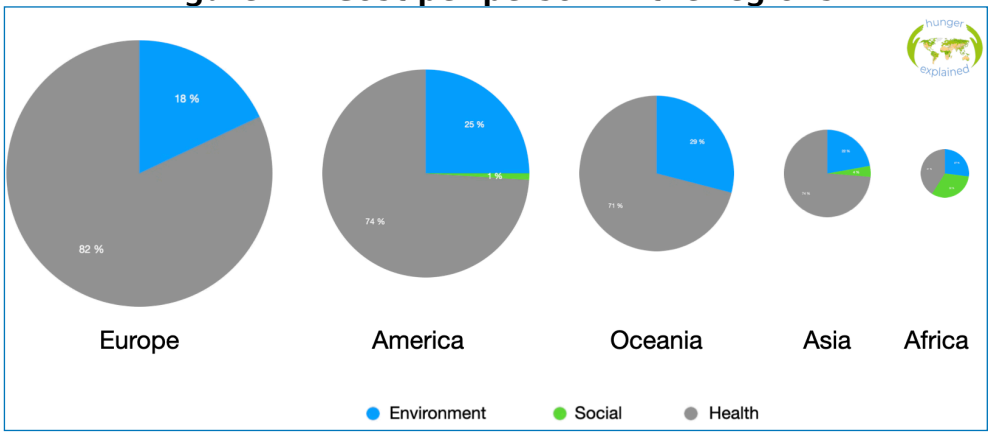


Figure 3 – Cost per person in the regions



Source: data from FAO, 2023

[4] Defined as a food system where value added per worker in agriculture is high, a large part of calories are not coming from staples, high urbanisation and high presence of supermarkets.

Health costs are higher in richer regions (Europe, Oceania and America), and social costs are more important in poorer areas (Africa and Asia), but are quite low and mostly in relation to poverty and hunger.

The higher health costs in rich countries are probably also due to the method of estimation that measures them in terms of GDP loss linked to lost working days and because labour productivity is greater in those countries. Because of this, costs are generally more in rich countries than in poor countries.[5]

More remarkable, perhaps, is that the environmental costs are roughly similar in all regions (this may be because the same type of models are used to compute them), with Europe being, though, slightly below. This last observation could be put on the account of one main difference: little deforestation, if any, in Europe, and, maybe, more elaborate environmental regulations. However, environmental costs cover several types of costs, making the interpretation awkward.

Interestingly, some studies, at country level, estimate product-specific costs, thus identifying those food products that generate more costs not reflected in markets. This is a useful information when it comes to deciding concrete measures for orienting food systems towards more sustainability.

Last remark, two studies include in their estimates, public expenditure in support to food systems (France and the UK), and one adds food imports (UK).

What do these results tell us?

<u>What matters, and… what does not</u>

Very few big surprises. In a way, the results are rather disappointing: despite the efforts made to mobilise huge amounts of data and models, the figures produced do not really add that much value to the debate, except, perhaps, when they refer to product-specific costs.

One may therefore question the worth of the effort, particularly as the recommendations made, on the basis of the analysis, lack originality and are not that operational: they are mostly made of somewhat cautious generalities that have been around for years.

The sceptics may find that the results of the analyses are running after reality:

- Climate, biodiversity and the environment being **high on the global agenda**, more efforts are made to develop a method (or models) to estimate their cost, and they are well present in the studies. One word of caution is required, however, when, in some cases, degradation has become or is on

[5] despite the use of purchasing parity exchange rates.

the verge of becoming **irreversible**. In such circumstances, 'normal' costing methods are inappropriate.
- The trend towards more overweight and obesity throughout the world [read] is perhaps the **most spectacular change** occurring in the domain of food, and it is reflected as the most important cost of food.[6]
- Meanwhile the cost of the **rural-urban drift**, perhaps because it is considered as a 'natural' phenomenon, unavoidable, **is not measured**. Yet, it is the main cause for the urbanisation of food systems and changes radically key aspects of food-related issues, including food insecurity [read]. This is hardly mentioned in the reviewed studies. The same goes for suicide and depression among farmers, and the **general underpayment of labour** in food systems [read pp. 4-7] and its consequences in terms of poverty and food insecurity, only referred to in one of the studies analysed - but that may change if ever farmer movements turned more violent.
- Lastly, actual **costs incurred by governments** to address some of the problems of food systems are left out by most studies, particularly those working at the global level.

In short, **results highlight some important questions that need to be solved, but neglect others that are, however, at least as important**.

The only real novelty, may be, is the presentation made by several studies of TCA as some kind of **new panacea** and the recommendation that it should be widely used, on the ground that it will help to make decisions more effectively for solving the issues existing in food systems.

Yet, the **lacunae and biases** in the estimates made, the assessment based on a single indicator (costs expressed in monetary terms) for very different problems, some even being sometimes linked to irreversible processes, give the illusion that all these costs of differing natures are comparable, addable and, maybe, interchangeable, that they can help in informing trade-offs and balances. The risk is that this simplification creates **a potentially dangerous illusion that could be misleading** when making difficult decisions that will orient - or not - food systems towards greater economic, social and environmental sustainability [read].

Recommendations

Health impacts being a major cost, some studies make recommendations, suggesting that consumers should eat better, healthier. However, they **remain vague** and succinct on what should be done for this to happen. Informing the public is not enough. The study on France is the only one that estimates what it would cost for the French to eat healthy - but for this to occur, it would not only be a matter of money, as the food system itself would have to change radically to be able to supply the healthy food required.

[6] It is interesting to note that the study of the UK's food system conducted in 2014, dit not estimate the cost related to this phenomenon [read], suggesting that **we only measure those costs we believe to be important** (like for contaminants, whose presence in the environment is measured only from the moment they are known to be dangerous).

Little is said on how health consequences linked to toxicity could be reduced, perhaps because it would open up a debate on technology and question the world's path dependency on agrochemicals.

Some see the solution in new technologies such as precision agriculture and vertical agriculture [read], others advocate more radical changes (i.e. agroecology, organic agriculture [consult our thematic page]) that have the 'disadvantage' of threatening the profits made by several major actors of food systems.

FAO's SOFA 2023 features examples aimed at illustrating how TCA can help solving food systems problems at the local level. However, they do not always show convincingly the value added by TCA to the debate… (see the example analysed in **box 2**).

To cut a long story short, TCA has some value, but it is everything but a panacea. It is just **a tool among others, with its limitations and biases.**

Box 2 - The private sector mobilised to save Ghana's cocoa?

In FAO's SOFA 2023 report, an example shows how private capital can address threats to cocoa production in Ghana.

The example explains that US multinational company Mondelez identified several incentives for a more sustainable cocoa in Ghana. They included training in sustainable agricultural practices, natural resources management, financial literacy and drying techniques, provision of improved cocoa and shade trees, income diversification, and access to finance, among other things [read p. 71].

In fact, in this example, there is no need to estimate costs to identify the incentives (activities) envisioned. It is enough to be aware that cocoa has been suffering from the degradation of the environment resulting from deforestation and the mining nature of cocoa production. And this is widely known.

To an independent observer, the 'incentives' identified by Mondelez look like more work for cocoa growers who are poor in their majority, while the price that is paid to them for cocoa is insufficient for them to graduate out of poverty!

To learn more about cocoa and multinationals, consult our thematic page.

Conclusion

What lessons can be drawn from this review?

True Cost Accounting (TCA) has become the most widely used approach for measuring nonmarket costs of food systems. Its promotion, at the time of the Food Systems Summit, has made it very visible and generated a series of studies, including FAO's major study conducted on more than 150 countries and at regional and global level, whose results were the topic of two successive reports on the State of Food and Agriculture in 2023 and 2024.

It is presented by its promoters as **the central tool for making food systems evolve towards greater sustainability**.

However, for the time being, there are no well documented and convincing cases showing how TCA can be integrated in decision-making processes leading to **operational decisions supported by all stakeholders and driving food systems towards more sustainability**.

The complexity of the work it requires and the opacity of the methods used for estimating costs **shapes its image as relatively technocratic** in the eye of the public. This image is further reinforced by the fact that TCA is mainly implemented by consultancy firms, researchers or academics.

Finally, in addition to the risk of offering a scientised version of the 'all-market ideology', mentioned in the 2020 article, experience shows now that it covers – at least for the time being – **only a small part of the range of issues existing in food systems** (some central matters are not at all dealt with), with the risk of skewing the analysis and, consequently, of **misguiding decision making**. The analytical methods it uses tend to give priority to economic aspects, at the expense of social, physical and biological dimensions of the problems tackled. They produce results that may serve more for advocacy than as a solid basis for decision making.

It could, however, possibly contribute to **a wider debate** on the evolution of food systems, provided it is open and organised with the participation of all stakeholders and **does not evade some fundamental problems of food systems** (e.g. distribution of power and the way technology develops, under-remuneration of labour and distress of people who work in it, and the role the state should play in them).

Materne Maetz
(March 2026)

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To know more:

- Teufel, J. et al., Internalisierung der externen Umweltkosten von Lebensmitteln. Umwelt bundesamt, 2025 (in German).
- Çınar, G. , Steinmetz, C. and O. Riemer, Literature Analysis of True Cost Accounting Methodologies and Databases for Agri-food Businesses and Products. First Interim Report of the TCA Roadmap Project, Berlin: TMG, 2025.
- Andersson, A., et al., The true cost of Swedish food consumption, Chalmers University of Technology, Gothenburg, 2025.
- Alliot, C. et al., Étude sur la création de valeur et les coûts sociétaux du système alimentaire français, le Basic, 2024 (in French).
- FAO, The State of Food and Agriculture 2024 – Value-driven transformation of agrifood systems, Rome, 2024.
- Arslan, A. et al., A typology for agrifood systems, Background paper for The State of Food and Agriculture 2024, Rome, FAO, 2024.
- FAO, The State of Food and Agriculture 2023 – Revealing the true cost of food to transform agrifood systems, Rome, 2023.
- Lord, S., Hidden costs of agrifood systems and recent trends from 2016 to 2023 – Background paper for The State of Food and Agriculture 2023, FAO Agricultural Development Economics Technical Study, No. 31, Rome, FAO, 2023.
- Hendriks, S. et al., The true cost of food: A preliminary assessment; Science and innovations for food systems transformation (2023): 581–601, Springer, 2023.
- Rastoin, J-L., Hidden costs and the fair price of our food: between the market, the State and the commons, So What ? Policy Brief 19, UNESCO Chai in World Food Systems, 2022.
- Patel, R., A democratic alternative to true cost pricing, Nature Food 2.9 (2021): 632–634.2021, 2021.
- Barrett C. et al., True Cost of Food, Measuring What Matters to Transform the U.S. Food System, The Rockefeller Foundation, Washington DC, 2021.
- Perotti, A., Moving towards a sustainable Swiss food system: an estimation of the true cost of food in Switzerland and implications for stakeholders. MS thesis. ETH Zurich, 2020.
- TEEB, TEEB for Agriculture and Food: Operational Guidelines for Business – Putting Nature and People at the Centre of Food System Transformation, Draft report, 2020.
- Food and Land Use Coalition (FOLU), Growing better: ten critical transitions to transform food and land use. The global consultation report of the food and land use coalition, 2019.
- Fitzpatrick I. et al., The Hidden Cost of UK Food, Sustainable Food Trust, Bristol, 2019.
- Esteban, A. et al, Urgent Recall – The UK's food system is failing – here's what success looks like, 2014.

Selection of earlier articles published on hungerexplained related to this topic:

- Vertical agriculture – a sustainable option for the future? 2025.
- An unequal world: facts, causes, consequences, and possible remedies… 2025.
- Farmers' situation and industrialisation, 2025.
- Our view of hunger is changing, … so should the way we combat it (urbanisation of hunger), 2024.
- In the heart of the global economic system: the protection of intellectual property rights, 2024.
- European farmers' protests: Simple crisis or signal of a necessary transition? 2024.
- Obesity is on the rise everywhere in the world, 2023.
- Agriculture, food and economic development – Is penalizing food and agriculture a sustainable development option? 2022.
- The real cost of food – Can the market alone guide our food systems towards more sustainability? 2020.
- Policies for a transition towards more sustainable and climate friendly food systems, 2018.
- Low agricultural prices, debt, farmer suicides, strikes and ban of purchases of cattle for slaughter: India's agricultural crisis, 2017.
- United Kingdom: a study demonstrates the failure of the British food system, 2014.

And consult our thematic pages on Technology, Power, Health, Organic agriculture and Migration.

Annexe

Table 2 – Results of hidden costs estimates in selected studies

Studies	Total hidden costs	Total hidden cost/capita	Environmental	Social[6]	Health	Economic	
World (FOLU)[1]	12000	1536	27 %		55 %	18 %	100 %
World (Hendricks)[2]	19000	2389	37 %		58 %	5 %	100 %
World (FAO)[3]	12749	1589	22 %	4 %	73 %		100 %
FAO - Regions							
Africa[3]	953	690	27 %	32 %	41 %		100 %
America[3]	2978	2899	25 %	1 %	74 %		100 %
Asia[3]	5857	1249	22 %	4 %	73 %		100 %
Europe[3]	2862	3819	18 %	0 %	82 %		100 %
Oceania[3]	99	2240	29 %	0 %	71 %		100 %
Country level							
Sweden (FAO)[3]	32	3059	16 %	0 %	84 %		100 %
Sweden[4]	30	2861	19 %	0 %	81 %		100 %
Switzerland (FAO)[3]	22	2595	16 %	0 %	84 %		100 %
Switzerland[5]	31	3588	39 %	19 %	42 %		100 %
France (FAO)[3]	178	2693	24 %	0 %	76 %		100 %
France	80[7] +	1210 +	18 %[8]	21 %[8]	61 %[8]		100 %
United Kingdom (FAO)[3]	255	3696	21 %	0 %	79 %		100 %
United Kingdom[9]	153	2227	44 %		55 %		100 %
United States (FAO)[3]	1576	4761	15 %	10 %	85 %		100 %
United States [5]	2100	6344	38 %	6 %	55 %	1 %	100 %

[1] in USD 2018.
[2] in USD 2021?
[3] in USD 2020 PPP.
[4] in USD 2022.
[5] in USD 2020.
[6] In the case of Switzerland, it includes taxes for funding subsidies, imports and free labour.
[7] This refers to government support to the food system + social costs borne by the state, in USD 2021.
[8] This breakdown refers only to social costs borne by the state.
[9] in USD 2015.