

A HOUSE DIVIDED CANNOT STAND: ADDRESSING THE THREAT OF GLOBAL FOOD INSECURITY THROUGH MULTIDISCIPLINARY SYSTEMS THINKING

ABSTRACT

This essay discusses global food insecurity and its physical, political, and socioeconomic symptoms. It will focus on systems thinking, adopting a whole-of-systems approach in recommending concrete steps on how to address this looming crisis. The first part provides an introduction of the magnitude of this problem through global research data and outlines how hunger afflicts both developing and developed countries. The second part discusses its potential transpolitical and economic outcomes. It fleshes out why food insecurity is a problem which affects sustainable development and global poverty alleviation in the long run. The third part of the essay forwards the concept of whole-of-systems and the systems thinking approach. It emphasizes that solutions towards food security do not lie within the sole domain of policy-making, but rather belongs to where all disciplines can provide critical contributions, providing concrete examples thereof. In conclusion, the essay highlights how the synergy of the various academic and professional disciplines, adopting systems thinking, is essential to deliver immediate and feasible plans of action towards the resolution of this urgent global challenge.



"The Journey of Food." faux oil on canvas, in the style of Vincent van Gogh and Katsushika Hokusai

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INTRODUCTION

World hunger is an issue that affects millions of people around the globe.

Although food production has increased over the past few decades, a lot of factors have contributed to the rising levels of hunger and malnutrition worldwide.¹ These include economic factors like poverty and systemic inequality; political factors like conflict situations and weak public health systems; and environmental factors like climate change.

Hunger manifests in a number of ways. Reduced quality, variety, and desirability of diet; disrupted eating patterns; and reduced food intake are its most primary forms. The World Food Programme classifies access to nutritional intake into five levels: food security, food insecurity, acute food insecurity, humanitarian emergency, and famine.² Food security is also known as zero hunger, the primary aim of Sustainable Development Goal (SDG) 2. Food insecurity is the first stage of hunger, when people have difficulties in meeting their basic nutritional needs. In this situation, five to ten percent of the total population is malnourished. Acute food insecurity happens when people must go to extreme lengths, even the sale of personal necessities, just to obtain their required calories. Humanitarian emergency situations are when people face extreme food shortages, with up to 30% of the population severely malnourished, leading to hunger-related deaths. The most critical level is famine: more than 30% of the population confronts extreme shortage of calories per person.

People living in extreme poverty have the lowest access to food, and the effects of hunger are especially devastating to infants, children, and pregnant women. Despite the international community's efforts to reduce hunger, the numbers are still alarmingly high.

The 2022 State of Food Security and Nutrition in the World, prepared by the United Nations' Food and Agriculture Organization (FAO), lists a number of worrying statistics.³

- At present, healthy diets remain unreachable for 3.1 billion people, with 2.2 billion moderately food insecure and 924 million people threatened by extreme hunger and famine.



*"Clipped Wings," faux watercolor on parchment
in the style of John Singer Sargent*

- Transcontinental studies indicate that up to 35% of women face maternal undernutrition.⁴ This significantly contributes to infant and childhood malnutrition around the world.
- For 149 million children under the age of five, the chronic unavailability of proper nutrition has led them to experience stunted growth and development. For another 45 million children, this has led to extreme forms of malnutrition, wasting away at such a young age.
- All in all, 9.8% of the world's population is affected by hunger. This translates to as many as 828 million people facing food insecurity and undernutrition to outright famine and widespread hunger-related deaths.

Hunger as a Global Challenge

For many people in the developed world, the concept of world hunger elicits images of children in deprived communities and underdeveloped countries. Unfortunately, many perceive these mental images as snapshots of lives very far from their own. But what they might not realize is that world hunger affects everyone, both directly and indirectly, regardless of where they live. Global food insecurity is a problem which eventually comes knocking at everyone's door.



*"Wasteland Village," faux oil on linen
in the style of Caravaggio*

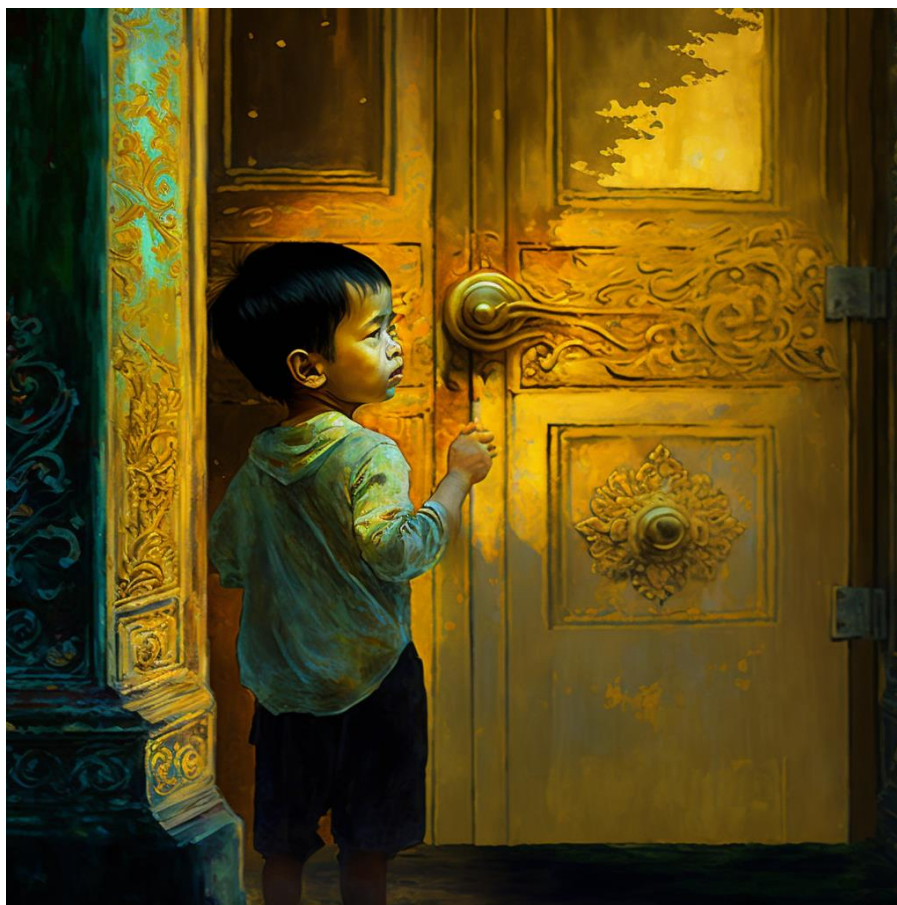
For sure, hunger affects developing countries more due to a variety of factors. In fact, 2016 World Bank data indicates that 70% of the world's hungry come from underdeveloped nations in Asia.⁵ Developing countries confront a number of challenges which complicates how they address food insecurity. According to the Office of the High Commissioner on Human Rights, first among this is poverty and growing inequality.⁶ Directly, poverty and socioeconomic inequality can limit people's ability to obtain sufficient amounts of nutritious food, potentially leading to malnutrition. Indirectly, these can also cause food insecurity by restricting access to education,

healthcare, and other public resources, which contributes to nutritional deficiencies and other health issues. Other aspects of social inequality include race and gender, which often lead to discriminatory practices and denial of access to basic human rights, including proper nutrition.⁷

Climate change is also a driving force for hunger.⁸ It can cause extreme weather events such as droughts, floods, and heat waves, which can lead to crop losses, reduction in arable, pasturable lands, and decreased food availability. Climate change can also negatively affect crop quality, leading to decreased nutritional value and increased food insecurity. In addition, climate change can cause changes in the distribution of pests and infectious plant and animal diseases, further reducing food availability and quality. Data aggregates from the World Bank highlight how all of these lead to rising food commodity prices around the globe.

In addition, the International Food Policy Research Institute declares that to end famines and provide lasting solutions to chronic hunger, good governance is required.⁹ After all, weak government systems can exacerbate hunger in a number of ways. In many cases, poor governance translates to inefficiency and corruption, which can cause resources to be diverted away from food production, distribution, and safety. Consequences include insufficient investments in agricultural research and development, as well as inadequate infrastructures. This can limit farmers and other food producers' rate of production and access to markets, thereby reducing food availability and increasing food commodity prices. Finally, weak government systems can lead to poor policy implementation and inadequate support for the most vulnerable, resulting in higher levels of food insecurity.

All of the abovementioned factors, from poverty, inequality and discrimination to weak government systems and the challenges posed by climate change, can aggravate social and political instability, further exacerbating widespread hunger. In fact, in most food crises around the world, the UN reports that conflict is their number one driving factor.¹⁰ Aside from labor and market displacement, crop failures, and environmental damages, conflict can also result in disruptions in the global food chain and soaring inflation. All of these are factors in worsening food insecurity, even beyond national borders. The current conflict situation in Ukraine is a prime example, affecting the global food chain and over-all food security worldwide.



"The Promise of Food," faux oil on canvas in the style of Vincent van Gogh

Lest we think that hunger is only a problem for developing countries, metadata analysis shows otherwise.¹¹ Examples of widespread hunger in developed countries include the United States, where one in nine people are food insecure. In addition, 67.5% of pregnant American women face food insecurity.¹² In Canada, one in six households are food insecure.¹³ This translates to 5.8 million people, 1.4 million of them children. In the United Kingdom, the rising number of food banks reveals that one in seven people have reported cutting back on food, with at least two million adults having to go an entire day without eating. Prior to the pandemic, 3.6 million Australians have reported experiencing hunger, with 60% of them facing food insecurity at least once a month; this rate has only increased since then.¹⁴

Even countries with good records in addressing food insecurity face significant threats in these changing times. Japan, for example, is jeopardized by the looming crisis in Taiwan due to its low food self-sufficiency.¹⁵ The European Union reports that despite being a top producer of agri-food products and currently not at risk of food shortages, affordability is becoming a problem for tens of millions of citizens due to inflation and higher food prices.¹⁶

In sum, hunger affects developing countries harder, but even highly developed countries can face rapid deterioration in food security. Hunger is truly a pressing global problem.

THE OUTCOMES OF HUNGER

The Merriam-Webster Dictionary describes hunger as “an uneasy sensation occasioned by the lack of food.”¹⁷ The UN FAO characterizes this as uncomfortable and even painful, caused by insufficient consumption of dietary energy.¹⁸ Some symptoms of hunger include stomach growling, contractions and acidity, headaches, shakiness, low energy, and lack of mental focus.¹⁹

Chronic hunger, for its part, has a number of long-term, devastating effects. For children it includes malnutrition, stunted growth, poor cognitive performance, and in extreme cases, infant and child mortality.²⁰ For adults, chronic hunger can mean chronic diseases. Strong correlation exists between severe food insecurity and disorders like heart disease, diabetes, and high blood pressure.²¹ No questions about it: hunger can kill.

But the thorny tendrils of hunger go way beyond the individual and the physical. In fact, it can result to a number of harmful political and socioeconomic consequences for communities, countries, and international coalitions affected by it.

Aside from harms to health, lowered life expectancy and decrease in quality of life, hunger also translates to decreased economic productivity. Chronically hungry people are not able to function at their full capacity due to lack of nutrition and the disorders that come with it. This can lead to increased rates of poverty, with people being unable to access basic resources and

services due to lack of funds. Other foreseeable consequences would be reduction in investments and entrepreneurship. All of these factors can trigger decreased economic growth for families and communities. Macroeconomically, this translates to stunted development and further heightens economic inequality at the national and international level.

Similarly, hunger can also have a significant impact on social development. Studies have shown that hunger can lead to decreased cognitive development, decreased social and emotional well-being, and lower levels of education and literacy.²² It is not hard to imagine the disastrous effects of a maleducated populace facing chronic hunger, especially its impact on the next generation. All of these serve to hamper the goals of sustainable, inclusive development and global poverty alleviation in the long run.



*"Red Revolution," faux oil pastel
in the style Edvard Munch*

But more than just socioeconomic growth, hunger can also lead to political insecurity in a number of compounding ways. Food insecurity can result in increased levels of social unrest, as deprived citizens become more desperate to meet basic needs for themselves and their families. Studies also highlight how poverty and violence go together.²³ This can lead to aggravated conflict, as people compete for scarce resources. These factors can fuel political instability, as governments struggle to find ways to address the food crisis. Ultimately, it can weaken national sovereignty, with developing countries increasingly more dependent on foreign aid in order to address their food security

challenges, and richer countries taking advantage of the situation to forward their selfish goals.

Even if individual countries might not be directly affected by these political developments due to hunger, the international community is held hostage by local and regional food crises happening in other parts of the world.

Hunger in developing countries resulting in political and social unrest can intensify transnational migration, with people seeking to escape food insecurity and poverty from their home countries. This can lead to spikes in population growth and corresponding enormous strain on resources in developed nations. Severe food insecurity in developing countries also increases global security and safety risks. The US Pentagon acknowledges how food shortages are connected to terrorism and other global threats.²⁴ In addition, those fleeing from famine are also potentially highly immunocompromised due to being malnourished, which could heighten the risks of carrying and spreading infectious diseases.²⁵

In sum, hunger and its amalgam of consequences piling onto itself is a lit fuse towards global instability. But is it the lack of food which is the problem?

Aggregated global data shows that total wastage amounts to 1.3 billion tonnes of food yearly. This translates to more environmental harms, not just because of unutilized resources but also because it produces a tremendous amount of greenhouse gases.²⁶ According to the UN FAO, if we stop wasting all these food, not only can we decrease GHG emissions by up to 8%, we could also feed the global hungry twice over.²⁷

The challenge here is how to produce food at the right time and at the right place, and to redistribute them to those in need. This means that at present production rates, we have to streamline distribution channels around the world and make them more efficient. To do this, we must focus on improving infrastructure and logistics. This includes investing in better roads, railways, and ports, as well as vehicles, storage facilities, and communication networks. Additionally, we should invest in technologies such as blockchain and artificial intelligence to increase efficiency and transparency.

Unfortunately, to do all of these things requires a lot of money. An aggregated study conducted by Ceres2030 indicates that we need US\$330 billion to solve world hunger.²⁸

A very simple solution that I can propose is this: billionaires.

As of December 2022, there are 2,668 billionaires in the world.²⁹ Billionaires have the potential to make a significant and meaningful impact in the collective battle against world hunger. They can use their vast wealth to fund initiatives and organizations that work to feed the hungry. Through contributions to food banks, food relief programs, and agricultural research and development, billionaires can help provide food and nutrition to those in stark need. They can also use their influence to bring attention to the issue of world hunger, encouraging multinational corporations and governments to provide more resources to address the problem. By doing so, these billionaires can make a consequential difference to help hungry families and starving communities all over the world.

Alternatively, they can donate to international organizations, like the World Food Programme, which has the organizational capacity and expertise to solve widespread hunger, pooling resources together instead of giving to individual charities flaunting their names. Crunching the numbers, if each of these billionaires donate US\$120 million each, then much of world hunger



*"Mr. Moneybags," faux oil on wood
in the style of Pablo Picasso*

can be solved by 2030, with just their chump change. In fact, even after donating this amount, majority of them (2448, to be exact) would still remain billionaires.

But of course, relying on ultra-billionaires to solve this problem is like waiting for pigs to fly. We have more chances of a million dollars falling into our lap. In truth, the very existence of billionaires is a manifestation of an important factor that greatly contributes to the rise of global hunger: systemic inequality.

Systemic inequality occurs when certain groups of people are denied proper access to resources and opportunities due to institutional barriers and historical injustices.³⁰ It is caused by policies and practices that are rooted in discriminatory and oppressive ideologies, such as classism, racism, and sexism. This can manifest in many ways, such as unequal access to educational and economic opportunities, unequal access to healthcare, and unequal access to justice. Systemic inequality has been a pervasive issue throughout history and continues to be a major obstacle in achieving lasting poverty alleviation and equitable sustainable development.

Systemic inequality is deeply connected to hunger. Racism, classism, sexism, and other forms of discrimination all contribute to unequal access to resources and opportunities, which in turn lead to relative poverty and limited nutrition. In many countries, people of colour, women and the LGBTQI+, and other marginalized groups are the most affected by hunger due to this. This inequality is further compounded by other factors such as limited educational opportunities and the lack of sufficient healthcare and other social services.

The existence of billionaires is a prime example of systemic inequality because it illustrates how tremendous wealth can be concentrated in the hands of a few individuals, while countless people around the world suffer in poverty. These 2000+ people have more money than 60% of the total global population combined.³¹ This extreme concentration of wealth is enabled by outdated politicolegal systems, many of which these ultra-billionaires have manipulated to become as rich as they are now. By concentrating global wealth in the hands of a few to the detriment of the rest of the billions of people in the world, these institutional mechanisms perpetuate systemic inequality, fortifying barriers against those living in poverty to escape the cycle and denying them access to even the most basic of resources and opportunities.

Ergo, to fight world hunger, we also need to fight deeply-rooted systemic inequality. Unfortunately, despite billionaire donations being the easiest solution, we cannot truly enlist the help of those who derive insurmountable benefits from the current, badly broken system. Our idealism must be tempered by realism.

Therefore, the question remains: what can we, as ordinary, informed citizens, do?

SOLUTIONS

The Whole-of-Systems Framework

Because the problem is systemic, the proposed set of solutions should be rooted in addressing systems as well. Enter the whole-of-systems approach.



*The Food System and its Elements*³²

The whole-of-systems approach is an interdisciplinary domain that seeks to improve the global effort against complex challenges. It does so by focusing on the various components of a system and assessing the nature of the links and relationships between and among each of them.³³ This approach takes into consideration the social, economic, political, and environmental factors that can influence the success or failure of any policy or project. Through utilising the principles of complexity within systems, it allows for a comprehensive, coordinated, and integrated approach to addressing a number of highly complex social issues.

To apply the whole-of-systems approach, first we have to understand systems thinking. Systems thinking is a term first coined by Prof. Barry Richmond in 1987.³⁴ Through the decades it has undergone many definitions:

- the art and science of understanding deep underlying structures (Richmond, 1987)
- a way of looking at wholes as more than just the sum of their parts (Senge, 1990)
- the ability to represent and assess dynamic complexity (Sweeney and Sterman, 2000)
- a system of thinking about systems (Arnold and Wade, 2015)

To put it in lay terms, systems thinking is a discipline which seeks to identify the connections between different variables within a system, how they interact, and their effects on the problem. To do so, it requires asking the right questions in order to make the right decision. It can best be described as a holistic approach to problem-solving to generate more effective, efficient, and equitable plans of action.



*"The Spitting Cobra,"
gold sculpture 3D render*

An oft-forgotten but very powerful aspect of systems thinking is how it can be used to identify potential unintended consequences of proposed solutions and to create strategies to minimize or mitigate these less-than-ideal outcomes.³⁵ The Cobra Effect occurs when policies which seek to forward a certain goal end up rewarding behaviour which results in the exact opposite of the goal. Otherwise known as perverse incentives, it was named after a government policy during British-colonized India.³⁶ Cobras were considered a deadly pest in Delhi, so the ruling government offered financial rewards for every dead cobra brought before it. Enterprising citizens, however, saw the loophole, and

started breeding cobras for profit. When the government realized its error, it withdrew the reward policy. Having no more need for the cobras, breeders released them into the wild, resulting in more cobras than ever before.

Systems thinking seeks to solve problems and avoid undesired consequences by understanding the complex web of relationships between different factors and how they contribute to these challenges. This way, a policy or program implemented in one aspect would not produce adverse consequences in others. In best case scenarios, it can actually enable policy and program strategists to shoot multiple birds with one stone. Because systems thinking can help solve global challenges through its integrated approach, it has a multitude of applications: from equitable sustainable development, to population health, to national and international security, among many others.

A key application for systems thinking is climate change. Systems thinking can be used to identify the underlying causes of climate change, as well as the interconnections between these different factors and how they influence each other. By simulating targetive responses to respective factors, it is possible to mimic potential outcomes and sustainable solutions without unintended consequences, both in the short and long terms.

The same can be true in alleviating world hunger.³⁷ We have previously identified the various causes of food insecurity; systems thinking can help understand each of them in depth, how they relate to each other, and how we can develop sustainable, cost-effective solutions to address them. These solutions can target challenges appearing in various forms, from the

economic and the physical, meaning logistics and supply chains, to the socio-political, as in the power dynamics at play and the imbalances between them. Looking towards the future, systems thinking can help us design and create sustainable production systems and supply chains that promote food security and equitable access to nutritious food around the world.

The whole-of-systems approach requires us to look at causes and solutions not as singular objects within their own vacuums, but rather as a giant, interconnected web, the lightest touch on one strand affecting all others. By applying systems thinking, we can develop solutions that are holistic, integrated, and sustainable. This is necessary to combat global hunger.

Systems Thinking and Concrete Steps

In this section, I will now outline three general ways by which we can utilize systems thinking to alleviate systemic inequality and the resulting food insecurity crises around the world.

The first proposed solution is to ***build the system stronger***. Adobe is one of the world's earliest construction materials. It is made of sand, silt and clay, along with various organic matter. Individually, each ingredient is soft and weak, but mixed together, the resulting material can be used to construct sturdy architecture lasting for millennia.³⁸



"Zihun Itmu," adobe architectural render

In the same way, combining different perspectives to solve a single, complex problem like world hunger can provide creative insights that no single person or field ever could.

I base this on personal experience: as an environmental economist, lawyer, and university senior lecturer, I am currently on the roster of consultants for the Legal Services for Development at the UN FAO. But I know that even with my years of experience and multidisciplinary approach, I cannot provide all the answers. I have to rely on and learn from other disciplines for collaborative engagements so that we could co-create policies which are effective, efficient, and equitable.

There are so many ways that different fields can contribute to solve the stark inequality in food availability and distribution around the world.

The physical sciences, including chemistry, physics, and biology, can help address global food insecurity by providing key research and technologies that can improve food production, storage, and distribution. They can develop new tools and techniques to better monitor soil health, reduce water and pesticide usage, and optimize crop yields, including recovering nutrients from waste and fixing them back into the soil. They can also help develop new ways to store food, promote food safety, reduce food waste, and improve the over-all effectiveness of food distribution networks.



"Food Experiments," faux crayon on paper

The intersections between them can yield important discoveries, too. Molecular biochemistry, for instance, can be used to understand nutrition absorption, and how we can optimize it depending on the chemical structure of food and supplement intake. Other applications involve research into the production of biofuels from waste and reinvesting the energy back into local food systems.

The humanities play a crucial role in solving world hunger as well.³⁹ By providing a more holistic approach to human-centered issues related to food insecurity, research in the humanities can help explore its cultural, social, and historical dimensions. This necessarily involves deeply-intertwined issues such as systemic inequality and poverty. Through the humanities, innovative solutions can be proposed. For example, both sociology and cultural anthropology can help understand preferences for food, while behavioural economics and psychology can design behavioural nudges for people to adapt more sustainable diets, like less meat or substituting lower resource-consuming bananas for other sources of carbohydrates. Political science and economic analysis of law can analyse power structures related to food systems governance and propose policy modifications for more efficient and equitable legal frameworks.

Perspectives from the study of business and economics can provide insights on the global food market and supply chain as well as the dynamics of producer and consumer behaviour, allowing for more strategic and data-driven decision-making. Business research can also help identify and foster new investment opportunities to develop innovative solutions, such as funding development projects on local food production systems or investing in start-ups pioneering the use of novel methods to reduce food waste.

Even radical technologies like artificial intelligence, blockchain, and the internet of things also have important roles to play in addressing world hunger. AI can process big data, solve optimization problems, and use predictive analysis, which are incredibly useful for food production, storage and delivery.⁴⁰ Blockchain can increase the quality of food supply chains, helping safeguard sustainability in the production and distribution process.⁴¹ For its part, IOT can increase efficiency in productivity, as well as improve food safety.⁴²

The examples given here are non-exhaustive, meaning that each field and respective intersections with other domains can generate infinitely more solutions than the ones listed above. What is important to note is that one field cannot solve this titanic problem alone. It is only by integrating all of these research outputs, tech products, and domain insights in synergy that we can craft feasible, long-lasting solutions to the inherent inequality plaguing the global food system.

Of course, not everyone can work in the food industry. What the whole-of-systems approach highlights is that we don't have to crowd into the field of food security in order to have a crucial impact on it. This is why the second proposed solution is to **strengthen interconnected systems**. Encouraging people to work in related fields and collaborating with them can contribute to alleviating the global food crisis. How so?



"The Systems Tree," 3D modelling

A healthy environment fosters high quality food production, and many different fields contribute to the latter by providing necessary support to the former.⁴³ Take the example of the humanities focused on protecting the environment. Integrating studies from social psychology, sociology and anthropology can yield varying insights on the rampant culture of consumerism based on how social and cultural norms shape people's attitudes, beliefs and behaviours. By doing so, they can develop behavioural and social interventions which could contribute to preventing wastes. Another example is combining physics and chemistry into material sciences

engineering with the aim of creating more sustainable products and technologies. By applying knowledge from different disciplines to lessen wastes, it moderates harmful anthropocentric impacts, consequently improving the environment's food production capacity.

Working in the field of climate change can help achieve the same goal.⁴⁴ Scientists are developing improved models for forecasting weather pattern effects based on geographic location and topographical features. New technologies to sequester carbon and nitrogen from the air mitigate global warming and transform them into useful resources. Carbon trading and climate finance are economic tools which aim to mitigate climate change through fiscal incentives. While their primary goal is to reduce the impacts of climate change, the results of their research, the technologies that they develop, and the outcomes that they create ultimately serve to benefit both producers and consumers within the global food system.



"Renewable," architectural render

Energy professionals are also instrumental in supporting food security.⁴⁵ Engineers are developing more efficient and cost-effective renewable energy sources which can be used to power the global food system. Feats in architectural engineering include designing smart houses, buildings, and other structures which are energy-efficient. Behavioural campaigns can be conducted alongside strategic pricing differentiation to reduce energy consumption. All these surplus energy and resources can then be reinvested back into food systems: more production at lesser costs.

Lastly, social justice and human rights impact the equality aspect of food security. Public interest lawyers help ensure that access to basic human needs, including food, education, and health services, are equitable. Anti-corruption activists seek to safeguard that public funds are spent properly, hopefully resulting to completed infrastructure, transportation, and service delivery projects. Development workers are active in SDG information and program implementation campaigns. Community organizers and civil society organizations are especially powerful voices for those who are disenfranchised. All of these efforts help dull the jagged edges of systemic inequality and poverty by assisting in delivering proper nutrition and other necessities to underprivileged families and impoverished communities.

Again, the examples above can be further expanded, with our imagination as the only limit to potential collaborations and links between and among different fields and various global problems.

For the last proposed solution: while it is essential to build a strong problem-solving system for the impending global food crisis, and also create interconnections with other systems solving related, similarly complex social challenges, it is equally important to zoom in and **empower individual elements within these systems**. There are many ways to interpret this: from providing technical and logistical support to the sciences, appropriating funds for additional humanities research, and incentivizing solutions-oriented, cross-disciplinary problem-solving teams.

One thing I'd like to highlight is the role of the community. In order to create strong food systems and limit the effects of stark inequality, it is essential that food-producing communities are also strengthened, particularly the farmers and the fisherfolk. In taking a bird's eye view of the problem, the role of local agriculture, aquaculture, and fishing industries should not be forgotten.



"Farmers and Fisherfolk," faux pastel in the style of Vicente Manansala

Local food production systems can help prevent food insecurity in several ways. Logistically, transnational supply chains deliver food products which can be more expensive and with reduced quality, due to extended travel time and transportation costs. They only become cheaper because of bulk purchase and economies of scale. Strengthening local agriculture, aquaculture, and fishing industries can ease direct access to nutritious, affordable, and high quality food. At the same time, doing so also creates more jobs and entrepreneurship potential. These can serve as potent economic opportunities to help people lift themselves out of poverty. From a political perspective, this allows nations to reduce reliance on food imports from potential disruptions in the international supply chain, termed as 'food sovereignty.'⁴⁶ All of these can contribute to more efficient and sustainable food chains, improved food safety and quality, and healthier, better-nourished communities as building blocks of greater society.

CONCLUSION

Global hunger has reached alarming proportions. At present, food insecurity affects billions of people, roughly 30% of the total world population.⁴⁷ To address this problem, the World Bank has promised US\$ 8.1 billion across 47 countries.⁴⁸ However, this is far from enough. The Ceres2030 study shows that we need US\$330 billion to solve world hunger by 2030.⁴⁹

Why the high price tag? Because food insecurity is immensely complex, and multiple factors compound on each other, creating a multi-layered web. Among these factors include conflict, climate change, poverty, and systemic inequality. Because of this, there are no easy answers to solve such a complex social challenge. While billionaire donations can ideally solve this, it might not be congruent with their personal interests, hence this is not something we should hold our collective breaths for.

The question now is: what potential solutions can we ordinary, informed global citizens have to offer? In this essay, I proposed to answer this question by highlighting the whole-of-systems approach and strategic systems thinking. After all, the problem is rooted in systemic inequality: shouldn't the solution therefore be systems-based as well?

First, we have to **build the system stronger**. To do this, we have to harness various fields to contribute their innovative ideas, research findings, and applied technologies to the problem of widespread hunger. Synergy of disciplines is important in addressing global crises because one domain alone cannot solve complex global problems. By combining different fields and perspectives to examine the underlying causes of the crisis, a more holistic approach can be taken to tackle global issues and develop effective, equitable, and sustainable solutions. The same is applicable to the global challenge of food insecurity.



*"A Story of Cooperation,"
stained glass art*

Second, we have to **strengthen interconnected systems**. All SDGs are intricately intertwined. We must therefore encourage solving other related problems side-by-side, including efforts against climate change, technologies for renewable energy, and social justice and human rights. Improvements in these fields translate to gains for food security as well.

Lastly, we have to **empower individual elements within these systems**. There are many potential real-life applications for this idea, but the primary example revolves around the community as the building block of society. Providing support to farmers and fisherfolk empowers local agriculture, aquaculture, and fishing, enabling consumers more direct and easier access to high-quality food. This set-up brings a number of benefits to greater society as a whole.

It's already 2023, yet in many parts of the world, poverty and inequality remain the primary causes of hunger and malnutrition. Every single day, 25,000 people, nearly half of them children, are dying from a preventable death.⁵⁰ In the span of two short decades, the world is again facing our third global hunger crisis.⁵¹

Food insecurity is a widespread problem that requires systems-based solutions, and every individual, regardless of race, profession, gender or class, can play an important part in making a difference. Now is not the time for feet-dragging: after all, a house divided cannot stand. It's high time that we all protest against rising inequality, put our collective brains together, and proactively collaborate to make sure that world hunger does not rear its ugly head again. ■



"Zero Hunger," photorealistic faux pencil color on parchment

REFERENCES

NOTE: All illustrations have been co-created with Midjourney AI using inspiration from classical painters and artistic works which have already lapsed into the public domain.

- ¹ Webb, Patrick, Stordalen, Gunhild Anker, Singh, Sudhvir, Wijesinha-Bettoni, Ramani, Shetty, Prakash and Lartey, Anna (2018). *Hunger and Malnutrition in the 21st Century*. British Medical Journal. [Link](#).
- ² Er, Mert (2021). *The 5 Steps from Food Security to Famine*. World Food Programme. [Link](#).
- ³ Food and Agriculture Organization of the United Nations (2022). UN Report: Global Hunger Numbers Rose to as Many as 828 Million in 2021. [Link](#).
- ⁴ Bhutta, Zulfiqar (2013). *Maternal Malnutrition Globally: Epidemiology and Links to Childhood Malnutrition*. SickKids Center for Global Child Health. [Link](#).
- ⁵ Christensen, Sara (2016). *Hunger in Developing Countries: Five Facts You Need to Know*. The Borgen Project. [Link](#).
- ⁶ Office of the United Nations High Commissioner for Human Rights (n.d.). Poverty, the Right to Food and Social Protection. [Link](#).
- ⁷ Raskind, Ilana (2020). *Hunger Does Discriminate: Addressing Structural Racism and Economic Inequality in Food Insecurity Research*. American Journal of Public Health. [Link](#); World Food Program USA (n.d.). #WomenAreHungrier. [Link](#).
- ⁸ The World Bank (2022). What You Need to Know About Food Security and Climate Change. [Link](#).
- ⁹ Dorosh, Paul (2017). *Ending Famines and Chronic Hunger Requires Good Governance*. [Link](#).
- ¹⁰ Haga, Marie (2021). *Breaking the Vicious Circle of Hunger and Conflict*. [Link](#).
- ¹¹ Pollard, Christina and Booth, Sue (2019). *Food Insecurity and Hunger in Rich Countries—It is Time for Action against Inequality*. International Journal of Environmental Research and Public Health. [Link](#).
- ¹² Kazemi, Farideh, Masoumi, Seyedeh Zahra, Shayan, Arezoo and Shahidi Yasaghi, Seyedeh Zahra (2020). *Prevalence of Food Insecurity in Pregnant Women and its Association with Gestational Weight Gain Pattern, Neonatal Birth Weight, and Pregnancy Complications in Hamadan County, Iran, in 2018*. Agriculture & Food Security. [Link](#).
- ¹³ CBC News (2022). Nearly 6 Million People in Canada Experienced Food Insecurity in 2021, U of T Study Says. [Link](#).
- ¹⁴ McCrindle (2021). The #1 Regret Most Australians Have about their Finances. [Link](#); Henriques-Gomes, Luke (2022). *Inflation and Inadequate Welfare Fuelling Australia's Food Insecurity Crisis, Foodbank Finds*. The Guardian. [Link](#).
- ¹⁵ Reynolds, Isabel and Huang, Grace (2022). *Low Food Self-Sufficiency Could Cripple Japan in Taiwan Crisis*. The Japan Times. [Link](#).
- ¹⁶ European Council (2023). Food Security and Affordability. [Link](#).
- ¹⁷ Merriam-Webster (n.d.). Hunger. [Link](#).
- ¹⁸ United Nations Regional Information Centre (2022). I am Hungry. What Does It Mean?. [Link](#).
- ¹⁹ Penn Medicine (2020). Are You Really Hungry? How to Your Understand Hunger Cues. [Link](#); Dix, Megan (2023). *What Causes Hunger Pangs and How Can You Manage This Symptom?*. Healthline. [Link](#).
- ²⁰ Jepkemboi, Grace (2017). *The Effects of Hunger on Physical and Cognitive Development of Children*. Assisting Young Children Caught in Disasters. [Link](#).
- ²¹ Waite, Tori and Thaelke, Olivia (2021). *3 Devastating Effects of Hunger on the Body*. Feeding America. [Link](#).
- ²² Cogan, Alyssa (2021). How Does Hunger Affect Learning. Heifer International. [Link](#).
- ²³ Crutchfield, Robert and Wadsworth, Tim (2003). *Poverty and Violence*. International Handbook of Violence Research. [Link](#).

-
- ²⁴ Davenport, Coral (2014). *Pentagon Signals Security Risks of Climate Change: Terrorism, Infectious Disease, Global Poverty and Food Shortages*. Hunger Notes. [Link](#).
- ²⁵ Roberts, Leslie (2017). *Hunger Amplifies Infectious Diseases for Millions Fleeing the Violence of Boko Haram*. Science. [Link](#).
- ²⁶ Wageningen University & Research (2021). A New Approach towards Food Loss and Waste including Greenhouse Gas Emissions. [Link](#).
- ²⁷ World Food Program USA (2022). How Food Waste Affects World Hunger. [Link](#).
- ²⁸ Laborde, David, Murphy, Sophia, Parent, Marie, Porciello, Jaron and Smaller, Carin (2020). *Ceres2030: Sustainable Solutions to End Hunger - Summary Report*. Cornell University, IFPRI and IISD. [Link](#).
- ²⁹ Dolan, Kerry and Peterson-Withorn, Chase (2022) *The Richest in 2022*. Forbes. [Link](#).
- ³⁰ Alliances for Africa (2021). What are Systemic Inequalities? [Link](#); Huang, Bihong, Morgan, Peter and Yoshino, Naoyuki (2019). *Demystifying Rising Inequality in Asia*. Asian Development Bank Institute. [Link](#); Hoffman, Kelly and Centeno Miguel Angel (2003). *The Lopsided Continent: Inequality in Latin America*. Annual Review of Sociology. [Link](#).
- ³¹ Oxfam International (2020). World's Billionaires Have More Wealth than 4.6 Billion People. [Link](#).
- ³² Bhunnoo, Riaz and Poppy, Guy (2020). *A National Approach for Transformation of the UK Food System*. Nature Food. [Link](#).
- ³³ International Security Sector Advisory Team (n.d.). Whole-of-System Approach (WSA). [Link](#).
- ³⁴ Arnold, Ross and Wade, Jon (2015). *A Definition of Systems Thinking: A Systems Approach*. Procedia computer science. [Link](#).
- ³⁵ Newell, Barry and Doll, Christopher (2015). *Systems Thinking and the Cobra Effect*. Our World. [Link](#).
- ³⁶ Rolnick, Matthew (2020). *Beware of the "Cobra Effect" In Business*. Forbes. [Link](#).
- ³⁷ Nature (2020). Imagine a World Without Hunger, Then Make It Happen with Systems Thinking. [Link](#).
- ³⁸ Mauricio, Ana Cecilia, Grieseler, Rolf, Heller, Andrew, Kelley, Alice, Rumiche, Francisco, Sandweiss, Daniel and Viveen, Willem Viveen (2021). *The Earliest Adobe Monumental Architecture in the Americas*. Proceedings of the National Academy of Sciences. [Link](#).
- ³⁹ The University of British Columbia (2021). How the Humanities Help Us Think Differently about Food Security and Climate Change. [Link](#).
- ⁴⁰ Bernabe, Danielle (2022). *How A.I. Technologies Could Help Resolve Food Insecurity*. Fortune. [Link](#).
- ⁴¹ MAPFRE (2020). Blockchain Will Be Key to Food Security. [Link](#).
- ⁴² Bouzembrak, Yamine, Klüche, Marcel, Gavai, Anand and Marvin, Hans (2019). *Internet of Things in Food Safety: Literature Review and a Bibliometric Analysis*. Trends in Food Science & Technology. [Link](#).
- ⁴³ Geneva Environment Network (2022). Food Systems and the Environment. [Link](#).
- ⁴⁴ The World Bank (2022). What You Need to Know About Food Security and Climate Change. [Link](#).
- ⁴⁵ Keren Kayemeth Lelsrael - Jewish National Fund (n.d.). Food Security and Renewable Energy. [Link](#).
- ⁴⁶ Sampson, Devon, Cely-Santos, Marcela, Gemmill-Herren, Barbara, Babin, Nicholas, Bernhart, Annelie, Kerr, Rachel Bezner, Blesh, Jennifer, Bowness, Evan, Feldman, Mackenzie, Gonçalves, André Luis, James, Dana, Kerssen, Tanya, Klassen, Susanna, Wezel, Alexander and Wittman, Hannah (2021). *Food Sovereignty and Rights-Based Approaches Strengthen Food Security and Nutrition Across the Globe: A Systematic Review*. Frontiers in Sustainable Food Systems. [Link](#).
- ⁴⁷ Food and Agriculture Organization of the United Nations (2022). UN Report: Global Hunger Numbers Rose to as Many as 828 Million in 2021. [Link](#).
- ⁴⁸ The World Bank (2023). Food Security Update | World Bank Response to Rising Food Insecurity. [Link](#).
- ⁴⁹ Laborde, David, Murphy, Sophia, Parent, Marie, Porciello, Jaron and Smaller, Carin (2020). *Ceres2030: Sustainable Solutions to End Hunger - Summary Report*. Cornell University, IFPRI and IISD. [Link](#).
- ⁵⁰ Holmes, John (2009). *Losing 25,000 to Hunger Every Day*. UN Chronicle. [Link](#).
- ⁵¹ The World Bank (2023). Food Security Update | World Bank Response to Rising Food Insecurity. [Link](#).
-