



Health Meets Food through a Metabolic Matrix

An Actionable Idea by a Member of the World Economic Forum’s Regional Action Group for the Middle East and North Africa

Call to action

This Actionable Idea is a call to action, contributing to:

Action 1: [Principles of Stakeholder Capitalism for the Middle East and North Africa](#)

Principle 5: Mitigating global health risks

Governments and the private sector are called upon to cooperate on a regional level in order to mitigate the impact of global health risks affecting their populations, as well as guest workers, and collaborate in such areas as research and development, digital health, and vaccine development and distribution.

Action 2: [UN Sustainable Development Goals](#)



– UN SDG3: Ensure healthy lives and promote well-being for all at all ages



– UN SDG12: Ensure sustainable consumption and production patterns

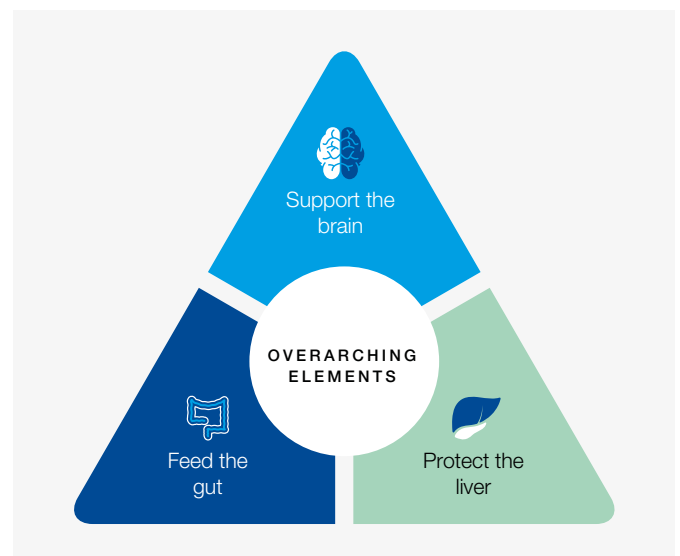
A new paradigm: health meets food

“Metabolic health” – the primary marker and outcome of nutritional security – needs to be re-conceptualized as a fundamental organizing principle to drive food system change. To achieve this outcome, the Kuwaiti Danish Dairy (KDD) company, currently working with an independent, evidence-based food re-engineering team, seeks the support of stakeholders from the Regional Action Group for the Middle East and North Africa to champion

this prototype and bring it to the United Nations Food Systems Summit and other international fora as an example of how a metabolic paradigm shift is not only possible, but necessary.

To work towards this outcome, **the metabolic matrix** developed by KDD proposes a scalable and replicable prototype for fundamentally shifting the basis for making commercial food and beverage products, built upon a new and safe paradigm of food processing that promotes metabolic health.

FIGURE 1: KDD product metabolic matrix



“The key to understanding chronic disease is that there are not four separate problems – nutrition, metabolism, inflammation, immunity; there’s only one, but they are all related.”

Robert H. Lustig, Professor Emeritus of Pediatrics, Division of Endocrinology, University of California, San Francisco (UCSF), USA

What is “food re-engineering”?

Food re-engineering is the scientific approach to creating foods with metabolically supportive ingredients and processes. The science behind such an approach looks beyond the product to health outcomes, crafting functional foods that are designed to protect our health, economy and the environment. Linking good food, metabolism and health reduces or eliminates preventable, diet-related diseases and the burdensome financial burdens they foster.

Why do we need a metabolic matrix?

The current food and beverage industry model needs revamping. While this sector remains profitable overall, it does so at the expense of the externalities such as skyrocketing healthcare costs, government spending and environmental damage. The current “healthcare bubble” is ready to burst. Public health and financial security will therefore deteriorate if the design, procurement and marketing of mass-produced foods do not change dramatically.

Several critical factors are converging:

- A global tsunami of billions of people suffering from life-altering, chronic and preventable diseases such as diabetes, heart disease and cancer.
- Increased vulnerability to acute diseases such as SARS-CoV-2 and emerging health issues that are eroding the human immune system.
- Lack of improvement in global human and environmental health.
- Growing disparities in the access to nutritious, affordable food.

Key statistics

Metabolic disease in MENA

In 2019, 55 million adults aged 20 to 79 years are living with diabetes. This figure is estimated to increase to 108 million by 2045. Metabolic syndrome is a combination of medical disorders that, in concert, increase the risk of developing cardiovascular disease and diabetes. It affects about one in four people in the Middle East.

The cost

A diabetes epidemic is sweeping the MENA region. Based upon International Diabetes Federation (IDF) estimates, three countries from the Arab world are among the top 10 countries worldwide for the prevalence of type 2 diabetes: Saudi Arabia, Kuwait and Qatar. By 2045, the total expenditure on diabetes is estimated to reach 37.1 billion (ID 87.2 billion).

The cause of this “healthcare bubble” is often blamed on obesity. However, obesity is not the problem; instead, it is the result – just another biomarker – of the problem. Obesity does not cost much money; rather, the bulk of the healthcare costs are absorbed by a wide range of metabolic diseases (75% of all healthcare dollars) associated with, but not caused, by obesity. While 80% of obese people harbour these diseases, so do 40% of people with normal weight.

Leading chronic diseases fueled by metabolic dysfunction

- Diabetes
- Hypertension
- Lipid abnormalities
- Cardiovascular disease
- Non-alcoholic fatty liver disease
- Polycystic ovarian disease
- Cancer
- Dementia

The true causes that underlie these diseases are the subcellular pathologies that flood the liver, starve the gut and deprive the brain; these also affect people considered to be of normal weight. None of these subcellular pathologies have any cures, just symptomatic treatments.

The diseases and their root causes are still there, and so patients’ health deteriorates further. A helpful analogy to understand this problem is to imagine providing aspirins to patients with a brain tumor because they have a headache. This is why in the US, despite spending more on healthcare than any other country, lifespan has declined four years in a row.

Is it possible to forge a science-based metabolically oriented consensus in the food and beverage industry around the true nature of the problem? This paper supports the idea that such an understanding is vital to making progress, providing key points for discussion.

A game-changing ratio

What if all companies had to report on the ratio of total sugar used in the product portfolio over net sales? If applied at a national, regional, or global scale, such key performance indicators (KPIs) could move the food and beverage industry closer to meeting the World Health Organization recommended limit on added sugar (no more than 10% of total calories or 12 teaspoons per day). Most populations in the MENA region need to reduce added sugar consumption by at least 50% to meet established health guidelines, while added sugar is currently in 75% of all foods and beverages.

COVID-19: A communicable disease pandemic on top of a non-communicable disease pandemic

Research shows that patients with metabolic syndrome are highly susceptible to COVID-19 infection and are more likely to develop severe cases of COVID-19.

- The emergence of COVID-19 has revealed structural flaws in the food system (e.g. lack of access to healthy food) and the social inequities of processed food (increased non-communicable disease in people of colour).

- Obesity, type 2 diabetes and metabolic syndrome are among a cluster of risk factors linked to poor diet associated with an up to ten-fold increase risk of death from COVID-19; an ultra-processed food diet is a primary, if not the only, culprit.
- Processed food does not increase the infectivity of COVID-19, but it increases morbidity and mortality among those infected.
- An analysis of COVID-19 death rates shows that the countries with the highest average income had the highest mortality rates.
- Dietary changes can rapidly reduce the risk of health complications and potentially send type 2 diabetes into remission within weeks.
- International experts in medicine, dietetics and nutrition agree that eating unprocessed and nutritious food is essential to reducing the risk of COVID-19 complications, which could potentially save hundreds and thousands of lives worldwide.

A required paradigm shift

Many industries are shifting approaches to innovation by becoming outcome-focused as opposed to product-focused. Nutrition science, as it applies to the food and beverage industry, can no longer concentrate on products and profits because chronic metabolic disease wipes out those profits. The food industry has focused on promoting the notion that personal responsibility and calories are the causes of chronic disease, rather than examining the role that their products play in these diseases. The epidemics of diabetes, kidney disease and dementia are taking their toll on medical resources and healthcare budgets throughout the world, but are most prominent in the MENA region.

Columbia University economist Jeffrey Sachs has stated that the current food system fails to deliver on its core task – to sustainably provide nutritious food – and Duke University policy expert Kelly Brownell has argued that the entire processed food system begs to be repaired. The food industry must collaborate with scientists and policy-makers to improve metabolic health by rethinking the nutrition paradigm. They must provide nutritious, safe, affordable and accessible food. There is an opportunity to align with global sustainability and health goals such as those being promoted at the United Nations and the UN Food Systems Summit in 2021.

The primary goal must emphasize metabolic health; improvements in planetary health will naturally follow. By improving the metabolic quality of food, less nitrogen fertilizer will be used, fewer antibiotics will be needed, and therefore less carbon dioxide and methane will be generated.

A thematic example of the differences in the food design process (metabolically detrimental versus beneficial) is shown below.

The new international paradigm argues that today's health and equity challenges call for a shift from "food insecurity" to "nutrition insecurity" to catalyse appropriate focus and policies on access, not just to food but to healthy, metabolically nourishing food. Tom Vilsack, US Secretary of Agriculture, for instance, has stated that the United States needs to pivot from food security to nutritional security, meaning improvements in metabolic health to mitigate chronic disease.

KDD has forged and is adopting a metabolic matrix framework prototype that can be used by any food and beverage company to reformulate existing products and incubate new products to improve global metabolic health. If such an approach were adopted within the food and beverage industry more broadly, millions of lives could be saved, and trillions of dollars could be redirected towards sustaining the global population and planetary health, rather than simply managing chronic disease.



Expanding product development to include human health outcomes is a game changer.

Scalability across countries and industries in the MENA region

The metabolic matrix prototype is replicable and scalable, and can be adopted by any company that is willing to prioritize metabolic health and invest in its future and the future of its consumers. At the same time, strategies framed around metabolic health and nutritional security can accelerate transformations within other sectors – technology, finance, government and industry – shifting focus to outcomes.

Changing the food system in the MENA region represents numerous challenges, including the fact that there is not as much arable land for growing food. Hence, most food is either imported or reconstituted from ingredients obtained from other countries and climates. Nonetheless, this presents an opportunity because there are limited numbers of companies and importers, so it may be easier for companies to band together to provide consistency. This depends on providing these stakeholders incentives to rethink their current food production, procurement and marketing strategies.

Pillars and principles of the metabolic re-engineering matrix



1. Feed the gut

- Soluble fiber
- Insoluble fiber
- Reduce processed carbohydrates
- Whole intact food (cellular) matrix
- Provide prebiotic nourishment (dietary fiber)
- Replace probiotic nourishment (gut microbiota)



2. Protect the liver

- Fructose reduction
- Reduce total sugar intake
- Appropriate hydration
- Reduce environmental toxins
- Reduce glycemic load



3. Support brain health

- Through nutrient-dense foods
- With healthy fats
- With healthy proteins providing sufficient and appropriate amino acids

Elements of the metabolic matrix working prototype

1. Assess the health needs of the population served by addressing nutritional deficiencies, metabolic and environmental challenges.

2. Stakeholder acceptance as a key principle. This requires a thorough vetting of the science, economics (cost vs benefit) and societal/environmental outcomes.

3. A task force by the company's executive leadership considering the entire portfolio. No "sacred cows", everything on the table, transparency, integration, dialogue, education, etc.

4. Leadership engaged in all key divisions of the company (product development, production, marketing, sales, etc.)

5. An independent team of scientists, doctors and researchers paid by a trust set up outside of the company to maintain objectivity.

6. A precise science and outcome-based definition of what a metabolic model is. The entire process from field to table is considered:

- What is in the food?
- What has been done to the food?
- What is the metabolic impact of the food, both short term and long term?

6. Scientific, evidence-based reviews of all ingredients used (of concern, of interest).

7. Laboratory testing/detailed data generated on ingredients and products; every decision regarding formulation or reformulation is guided by data, evidence, science and metabolic impact.

8. Comprehensive reviews of suppliers, sources, production methods of all ingredients, including nutrition, environment, quality, equity, etc. Specific targets and priorities remain proprietary within the hosting entity.

9. Focus on:

- Functional foods, proteins, fats, carbohydrates, micronutrients, phytonutrients
- Prebiotics (particularly fiber) and probiotics, amino acids, fatty acids
- Filling nutritional deficiencies with vitamins and minerals
- Addressing at-risk populations, disparities, food access, affordability

10. Engagement and extensive vetting of leading-edge providers of food solutions:

- Sugar reduction/replacement
- Non-caloric sweeteners
- Healthier fats, etc.

11. Time-bound set(s) of milestones for stakeholders are essential. This involves both internal and external stakeholders and must be integrated into a KPI framework that aligns internal teams and external business, government, science and other vital interests.

Implementing a metabolic reset

It is essential to craft a metabolic reset so that each stakeholder sees its enactment as in their best interest. This means taking into account, in each country, cultural and economic issues, medical and public health issues, climate, agricultural and sustainability issues, and class and poverty issues. But most importantly, the food industry must see that this is a profitable way of doing business. This will require the participation of government.

It is one thing to understand the problem, but it is another to fix it. Education is not the same thing as implementation. This is true at the personal level, as consumer education alone has not mitigated the problem. The same goes for the industry as a whole. Fixing the problem requires specific goals and strategies, which must be based on science and physiology. To this end, KDD's re-engineering team consists of physicians specialized in neuroendocrinology and culinary medicine, in addition to PhD-level nutrition and data scientists, who work alongside the production team to align food science and nutrition to make healthy and sustainable products that are tasty and marketable. The key to this effort has been the development of a metabolic matrix, which has incorporated the three precepts of health: feed the gut, protect the liver, support the brain.

The role of industry and government stakeholders

Food industry stakeholders include food producers, food distributors, food marketers and food retailers. In the healthcare industry, stakeholders include patients, doctors, nurses, dietitians and nutritionists, dentists, hospitals and insurers. In the public health sectors, stakeholders include social services organizations, health quality organizations, medical societies, and food and environmental safety authorities.

Governments have a key role in pushing the industry and consumers to adopt the metabolic reset principles. This includes providing incentives ("carrots") and punishments ("sticks") to alter behaviour. Governments can place standards on food quality and their availability. They can also adopt the concept of "differential subsidization", for example, taxing harmful products that do not meet the metabolic reset while subsidizing healthy products that do. This will help encourage the private sector to produce more nutritious products and the populace in adopting them.

Calling on stakeholders to form a new metabolic MENA alliance

The need for establishing a systemic framework to address metabolic health in the MENA region is evident. An effective alliance supporting action at a country-wide or regional level is essential to provide the impetus for change. The high prevalence of metabolic disease in children and adults across the region is alarming, with horrific negative public health impacts on countries and age groups. No one country in the region can solve this problem alone. National health authorities in the Middle East and across the globe must take immediate action to arrest the epidemic of preventable, diet-related disease.

An alliance of forward-thinking medical, economic and political leaders is called for, and immediate actions must be taken to not only educate, but to forge policies and practices that can be embraced and propagated as a region, with strategies that focus and intersect at multiple levels: consumer, industry, health and government. There is also an opportunity to look beyond deep division lines to unite around common health goals and actions that will benefit all countries involved. Given the convergence of chronic and acute diseases affecting all in the region, key stakeholders must address food security by fostering positive nutrition that addresses public health. Nutritious, metabolically supportive, safe, affordable and accessible food is fundamental to regional security.

A MENA metabolic health alliance is proposed to facilitate the paradigm shift needed to break through the challenges and barriers that put the entire MENA region at risk. As part of the alliance, a working committee should be set up, consisting of key leaders in the MENA regions who are already vested in the entire region's public health and already fully supportive of the metabolic framework as the basis for a paradigm shift. Support from a few key institutions may be helpful to begin with, perhaps raising funds to support establishing the alliance and developing a website to facilitate networking and communication.

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