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BONUS RESOURCES

ARTIFICIAL INTELLIGENCE, HEALTH, AND TECHNOLOGY

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PUBLIC HEALTH NUTRITION AND FOOD ACCESS: USES OF AI IN PUBLIC HEALTH NUTRITION

(A GLOBAL PERSPECTIVE)

QUESTION TO THE READER:

While much of the conversation around AI in food so far focuses on the individual, household, and small population sectors, some of the most impactful work needs to happen in public health nutrition.

Do you believed that by integrating healthcare, agricultural, and socioeconomic data, AI can enable governments, NGOs, and researchers to monitor food systems, address inequities, and improve nutrition outcomes on a global scale?

DISCLAIMER:

The content presented in this publication is intended for informational and educational purposes only.

While it explores how artificial intelligence (AI) can be applied to public health nutrition such as mapping food insecurity, optimizing feeding programs, predicting malnutrition, monitoring food safety, and addressing nutrition inequities, it does not constitute professional advice in healthcare, policy, or nutrition.

The examples, case studies, and research references cited, including organizations such as the World Food Programme, UNICEF, FAO, and studies on precision nutrition and AI applications, are provided for illustrative purposes. The implementation of AI in public health nutrition involves complex technical, cultural, and regulatory considerations that may vary by region. Readers should consult qualified experts, local authorities, or peer-reviewed resources before applying any AI-based strategies in practice. While we aim to present accurate and up-to-date information, the rapidly evolving nature of AI technologies and global nutrition landscapes means that some content may change over time. Use this information responsibly and as a supplement to professional guidance.

Readers are also encouraged to reflect on how the concepts discussed may apply within their own context and to seek guidance from qualified healthcare, nutrition, or policy professionals before making decisions that could influence their health or wellbeing.

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-kwilsontheauthor

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The Public Health Nutrition Outlook

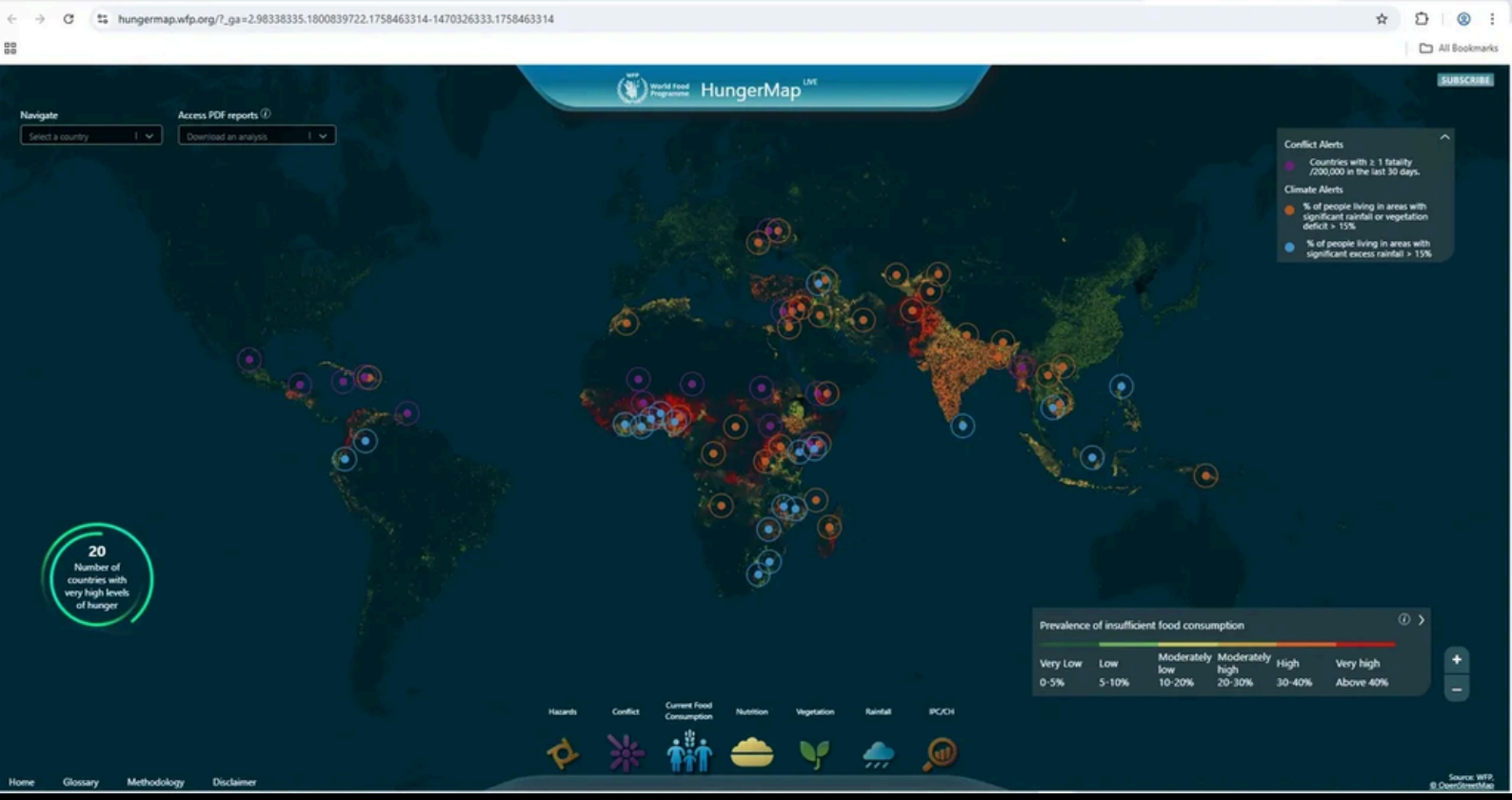
Artificial intelligence (AI) is increasingly shaping the way the world approaches public health nutrition, moving beyond individual or household-level solutions to address challenges at a population scale. By integrating data from healthcare systems, agriculture, socioeconomic trends, and environmental conditions, AI provides powerful tools for monitoring food security, predicting malnutrition, optimizing feeding programs, and reducing inequities in access to nutritious food.

From mapping global food deserts to tailoring school meal plans and tracking supply chain risks, AI is enabling governments, NGOs, and researchers to design smarter, more responsive interventions that improve nutrition outcomes worldwide. This section explores the key ways AI is being applied to public health nutrition on a global scale, highlighting both current successes and future potential.

KEY USES OF ARTIFICIAL INTELLIGENCE IN PUBLIC HEALTH NUTRITION

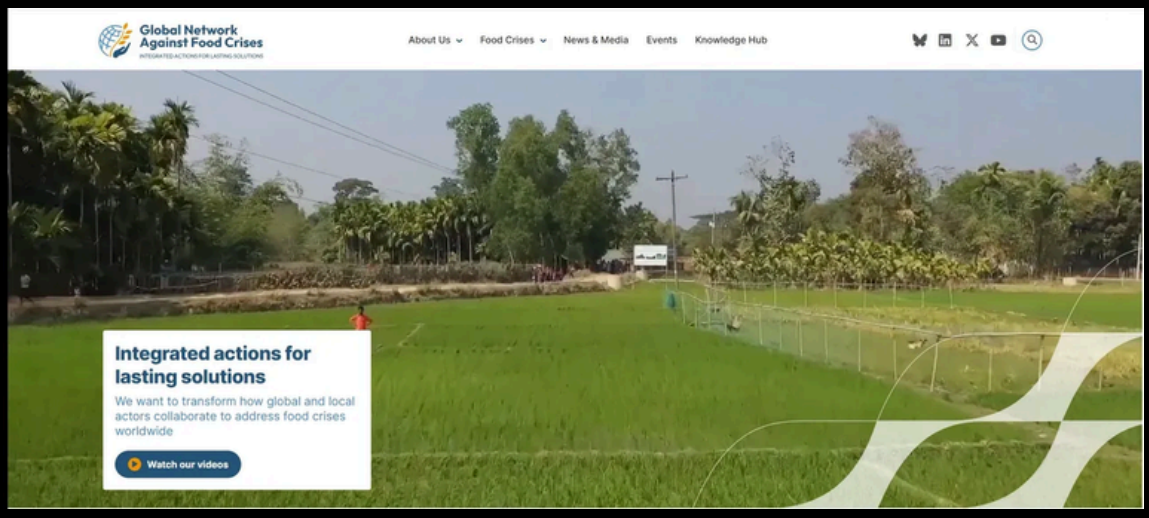
MAPPING FOOD INSECURITY

AI can synthesize data from demographics, market prices, climate, conflict, and infrastructure to identify where food is scarce or becoming scarce. These models help reveal “food deserts” and food-insecure zones not just at city level but across entire countries and continents.



World Food Programme's HungerMap LIVE [klewshare.org]

For example, the World Food Programme's HungerMap LIVE monitors food security in over 90 countries, using indicators such as rainfall, population density, conflict, market disruptions, and vegetation to flag hotspots in near real-time according to the World Food Programme. Similarly, the FAO, WFP, and other UN agencies in their Hunger Hotspots reports project food insecurity risk for many countries globally, forecasting where acute hunger may worsen due to climate shocks or economic instability.

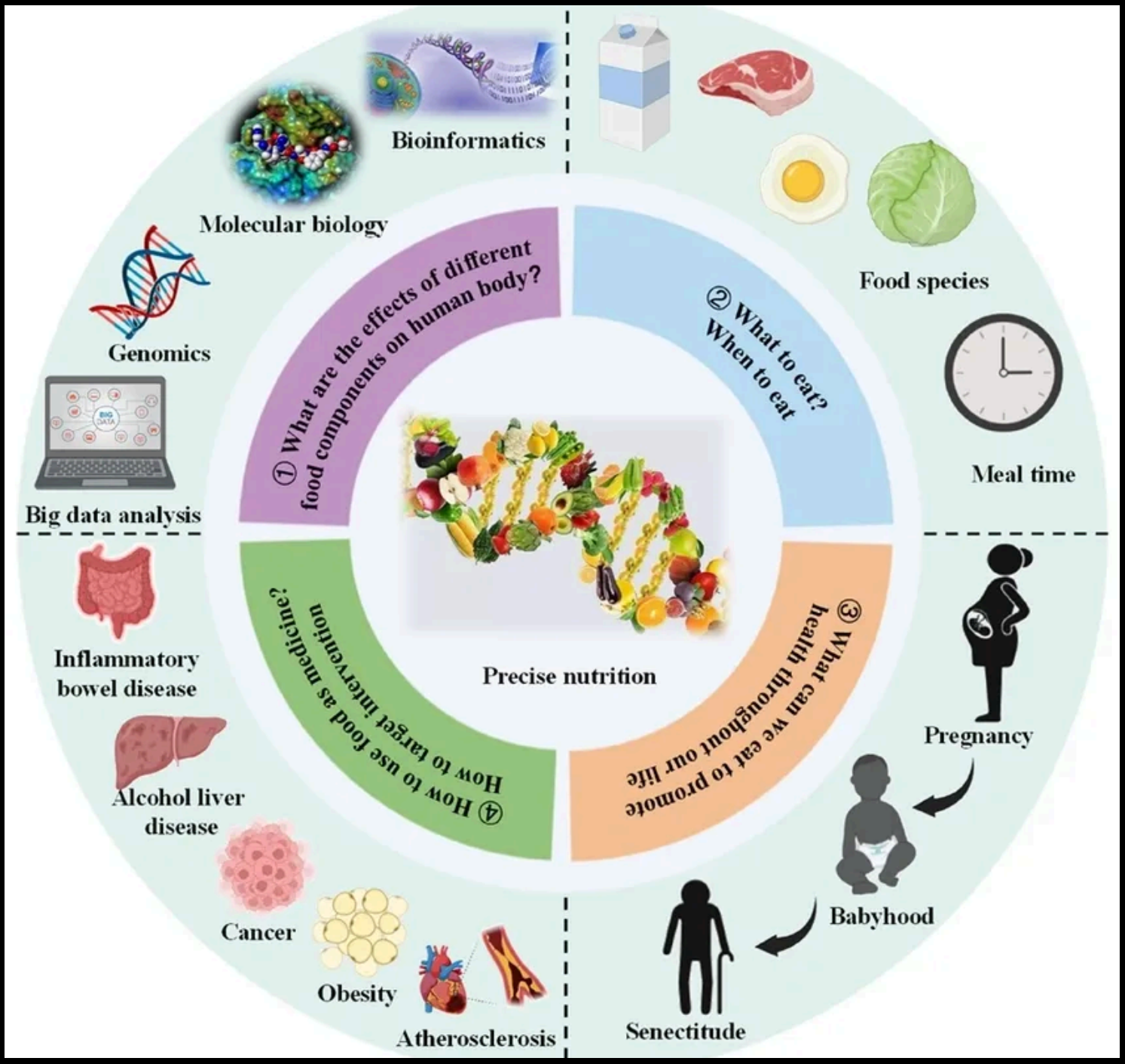


Global Network Against Food Crisis [klewshare.org]

Organizations such as the Global Network Against Food Crisis explains that its focus is on a combination of strategies including acquiring a deeper understanding of the actual food crises populations are facing; leveraging national, regional and global strategic investments to combat these issues; and integrating strategies that go beyond the food crises to address, " the underlying political, economic, societal, and environmental causes of food insecurity.".

OPTIMIZING SCHOOL AND COMMUNITY NUTRITION PROGRAMS

In many parts of the world, from low-income to middle-income countries, public feeding programs are central to nutrition, especially for children. AI can help these programs better forecast demand (e.g. how many meals needed, when), reduce waste, and ensure nutritional balance in offerings.



researchgate.net's Four Scientific Questions of Precision Nutrition
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Articles such as the, Advances in Artificial Intelligence and Precision Nutrition Approaches to Improve Maternal and Child Health in Low Resource Settings published on August 18, 2025 by National Library of Medicine's National Center for Biotechnology Information address the fact that malnutrition, "... continues to be a major threat to health, particularly maternal and child health in low resource settings, resulting in impairments in cognitive function, growth, and development, and metabolic diseases later in life...", further explaining that through the implementation of Artificial Intelligence, the possibility exists to develop precision nutrition which, "has the potential to complement program monitoring, efficacy evaluation, and ultimately to inform design of interventions to improve maternal and child health.".

Tackling and Elimination Food Waste through AI Application

In 2024, The Malaysian Journal of Social Sciences and Humanities published Harnessing Artificial Intelligence (AI) to Mitigate Food Waste: Innovative Strategies for Sustainable Consumption, a study by Muhammad Adieb Ahmad Wafi and Mohd Amzari Tumiran, the authors explained that Artificial intelligence (AI) is increasingly recognized as a promising tool for reducing food waste due to its ability to process large volumes of data and optimize operations across the food supply chain.

Addressing Nutritionally Balanced Offerings through AI Application

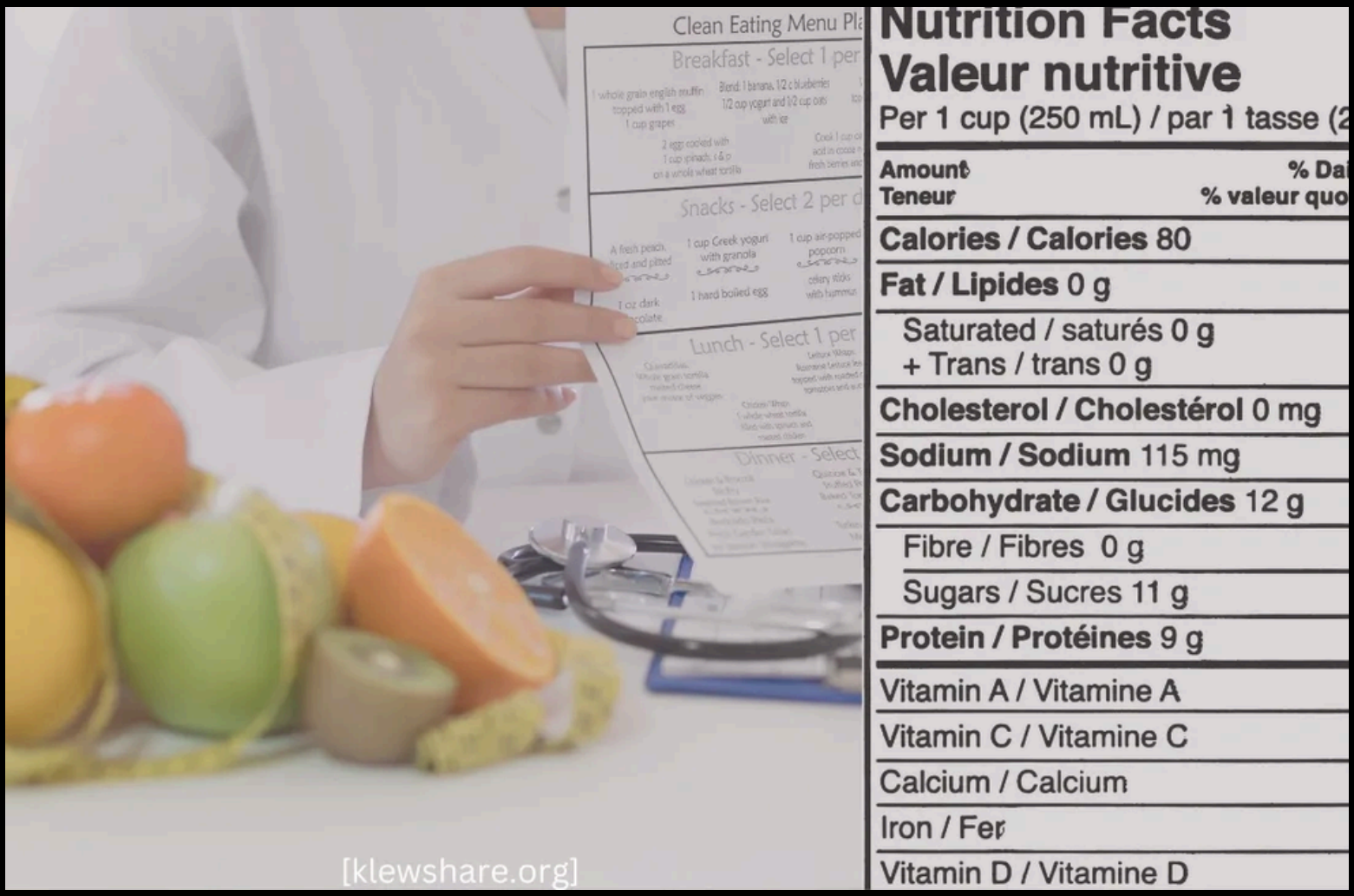
According to these researchers, awareness of AI's potential applications in this field remains limited among both organizations and consumers, which could be interpreted to mean that there is not enough of a clear understanding of how AI can actually positively impact these efforts. As such, the implementation of strategies for integrating AI into sustainable consumption practices would mean drawing on insights from existing research. The researchers also identified key approaches such as:

1) smart inventory systems,
2) recipe generation tailored to available ingredients,
3) automated waste monitoring,
4) predictive models for meal planning, and
5) the analyses of consumer behavior.

The findings of the research suggested that AI has the capacity to play a central role in minimizing food waste and promoting sustainability across agriculture, retail, and hospitality sectors with future investigations emphasizing long-term studies to evaluate the enduring impact of AI-based solutions on reducing food waste.

The Broader Scale of Addressing Nutritionally Balanced Offerings through AI Application

Another key issue identified in mapping food insecurity is ensuring nutritionally balanced in offerings. One of the most pressing challenges in global nutrition is ensuring that the food people have access to is not only safe and plentiful but also nutritionally balanced.



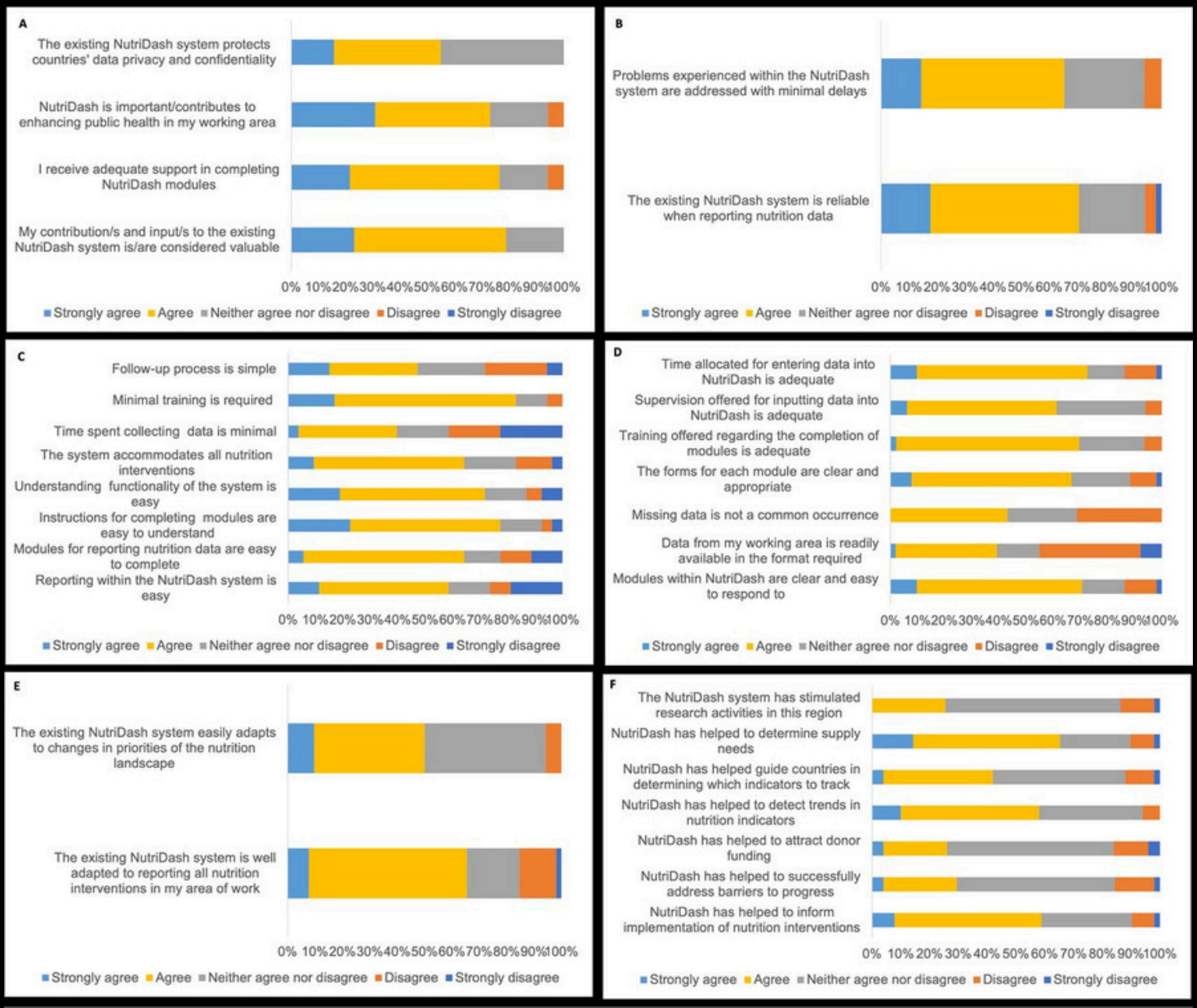
AI can play a transformative role here by analyzing vast datasets that include ingredient composition, consumer dietary patterns, and regional nutrient deficiencies. For example, machine learning models can help restaurants, cafeterias, and food delivery services design menus that reduce excess sugar, salt, or unhealthy fats while boosting micronutrients such as iron, vitamin A, or zinc.

On a broader scale, AI can integrate public health nutrition targets into consumer food environments. In countries struggling with malnutrition, AI-powered menu optimization could support food aid programs or school lunches by tailoring meals to fill gaps in essential nutrients. Meanwhile, in regions facing obesity or noncommunicable disease burdens, AI systems could recommend portion control strategies and healthier substitutes. Importantly, these applications require not just technical precision but also sensitivity to cultural preferences and local food availability, ensuring solutions are both practical and embraced by the communities they serve.

By combining datasets about school attendance, poverty, food supply, and local dietary habits, AI helps make meal planning smarter, more resilient, and more responsive to changing conditions (like economic inflation or climate impacts). Although detailed use cases are less documented globally, many aid organizations now integrate AI insights into their logistics and delivery planning in emergency relief and school feeding operations.

PREDICTING AND PREVENTING MALNUTRITION

Malnutrition, encompassing undernutrition, micronutrient deficiencies, and overnutrition, remains one of the most pressing global health challenges. It affects not only physical growth and cognitive development, particularly in children, but also long-term economic productivity and public health outcomes. Efforts to address malnutrition require timely, data-driven strategies that can identify populations at risk and guide interventions before conditions worsen. Here, artificial intelligence (AI) is proving to be an invaluable tool, enabling stakeholders to anticipate malnutrition patterns and act proactively.



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AI technologies are increasingly used to predict where malnutrition is likely to occur, allowing interventions to be implemented early and more efficiently. For instance, UNICEF's NutriDash platform collects and analyzes maternal and child nutrition data from over 125 countries, flagging regions where programs are lagging or children are at risk of undernutrition. Similarly, AI models can integrate satellite imagery, agricultural output data, climate information, and socioeconomic indicators to forecast food shortages or nutrient deficiencies at regional or national scales. According to UNICEF's State of Food Security and Nutrition in the World (SOFI 2025) report, between 638 and 720 million people experienced undernourishment in 2024, underscoring the ongoing scale of the problem. These predictive insights allow governments, NGOs, and public health organizations to strategically target interventions, such as nutritional supplementation programs, improved agricultural aid, community-based nutrition education, or emergency food distribution. By anticipating malnutrition before it becomes widespread, AI can help reduce preventable illness, support child development, and improve resilience in vulnerable communities.

MONITORING FOOD SAFETY AND GLOBAL SUPPLY CHAINS

Malnutrition, encompassing undernutrition, micronutrient deficiencies, and overnutrition, remains one of the most pressing global health challenges. It affects not only physical growth and cognitive development, particularly in children, but also long-term economic productivity and public health outcomes. Efforts to address malnutrition require timely, data-driven strategies that can identify populations at risk and guide interventions before conditions worsen. Here, artificial intelligence (AI) is proving to be an invaluable tool, enabling stakeholders to anticipate malnutrition patterns and act proactively.

Food safety and supply chain integrity are critical challenges in a globally connected food system. AI, often integrated with sensors, IoT devices, and big data analytics, is enhancing transparency, efficiency, and resilience at every step of the chain—from farm to fork. Predictive models can detect potential disruptions caused by extreme weather events, transportation failures, disease outbreaks among livestock, or contamination in processing facilities. For instance, AI algorithms can analyze climate data alongside crop yield patterns to forecast regional shortages or identify points in the supply chain vulnerable to delays.

Blockchain technology complements these AI-driven insights by providing a tamper-proof record of every transaction and movement in the food supply chain. Platforms like IBM Food Trust and TE-FOOD allow stakeholders to trace products from origin to retail shelf, drastically reducing response times during contamination incidents or recalls. In practice, this means that a contaminated batch of leafy greens can be traced back to the exact farm and shipment within hours, minimizing both public health risk and economic loss.

Partnerships between private companies, governments, and international organizations are expanding these capabilities globally. For example, the European Union has piloted AI-based supply chain monitoring systems to ensure compliance with food safety standards, while organizations like the Food and Agriculture Organization (FAO) are exploring AI tools to improve traceability in developing regions. By combining predictive analytics, real-time monitoring, and transparent recordkeeping, AI is helping make food supply chains more resilient, safer, and better equipped to handle global challenges.

ADDRESSING NUTRITION INEQUITIES

Nutrition inequities remain a pressing global concern, driven by disparities in wealth, geography, infrastructure, political stability, and exposure to climate risks. These inequities can manifest as undernutrition, micronutrient deficiencies, or overnutrition, often disproportionately affecting vulnerable populations such as children, the elderly, and low-income households. AI can help uncover these gaps by analyzing vast and diverse datasets, including household income, access to fresh and affordable foods, local health outcomes, and food price trends.

AI-driven mapping of food deserts regions with limited access to nutritious food can guide policymakers in targeting interventions. Platforms that integrate socioeconomic and environmental data can reveal communities most at risk and forecast where malnutrition may rise due to economic shocks or climate-related events.

Reports such as SOFI 2025 (State of Food Security and Nutrition in the World) highlight that while hunger and undernutrition have declined in some regions like Latin America and Southern Asia, parts of Africa and Western Asia continue to experience rising food insecurity.

AI tools, in combination with policy frameworks from organizations like the World Health Organization (WHO), can support governments in allocating resources more effectively. For instance, predictive models can help prioritize regions for subsidies, food relief programs, or investment in local agriculture, ensuring that interventions reach the populations most in need.

By providing actionable insights at both local and national levels, AI is helping address structural inequities in nutrition, enabling more targeted, equitable, and sustainable approaches to food security.

CAN WE TALK

policy?

Integrating AI for Policy and Resource Allocation

While AI applications in food often focus on monitoring or intervention at the community level, one of its most powerful roles is supporting policy-making and resource allocation at national and international scales. By integrating health, agricultural, economic, and social datasets, AI can provide governments and organizations with actionable insights for designing programs that are not only efficient but equitable.

For example, AI models can analyze patterns in household income, school enrollment, healthcare access, and local food availability to identify regions or populations at highest risk of malnutrition or diet-related diseases. These insights allow policymakers to prioritize interventions—such as food aid distribution, school feeding initiatives, or agricultural subsidies—where they are most urgently needed. Advanced AI tools can also simulate the effects of different policy scenarios, helping governments anticipate the potential outcomes of budget allocations, subsidy programs, or emergency food interventions before implementing them.

On an international scale, AI enables better coordination between multilateral organizations, NGOs, and local governments. Platforms that aggregate global nutrition data, such as NutriDash or FAO's Hunger Hotspots, allow stakeholders to monitor progress toward nutrition targets, detect emerging crises, and allocate funding more strategically. By combining predictive modeling, geospatial analysis, and real-time reporting, AI helps ensure that interventions are both timely and targeted, reducing waste and increasing impact.

Importantly, these AI-driven strategies must account for cultural, logistical, and political realities to be effective. Programs informed by AI must respect local dietary habits, religious practices, and regional food availability while remaining adaptable to rapidly changing conditions, such as climate shocks or economic instability.

When implemented thoughtfully, AI-powered policy and resource allocation has the potential to transform public health nutrition, moving beyond reactive measures to proactive, evidence-based planning that can reduce hunger and improve health outcomes worldwide.

Final Thoughts...

AI's role in public health nutrition, when viewed globally, is about more than improving efficiency—it's about building resilience, reducing hunger, and ensuring nutrition justice for all. By combining mapping, prediction, safety monitoring, and equity-focused interventions, AI can help transform how the world responds to food insecurity and malnutrition—not just in crisis zones, but across all countries.

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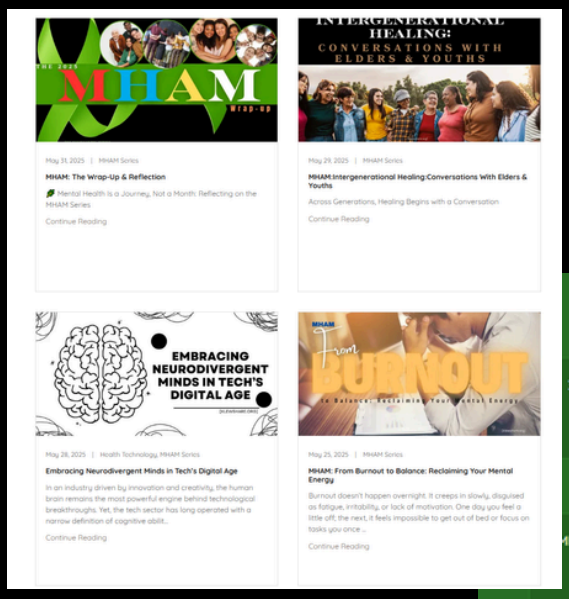

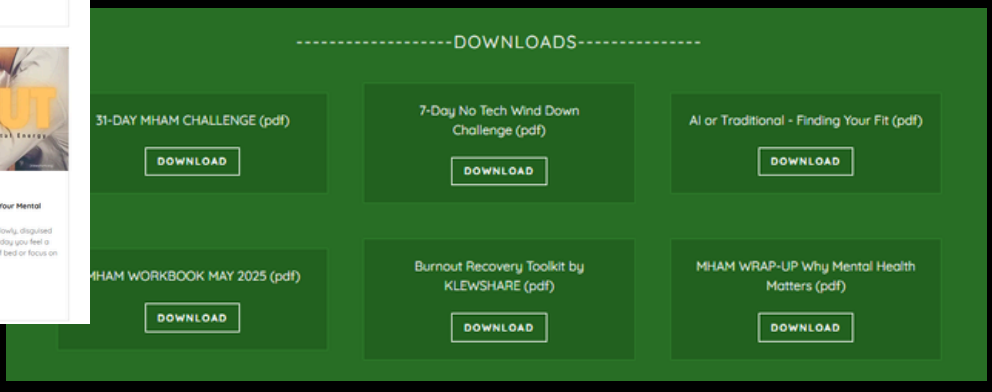

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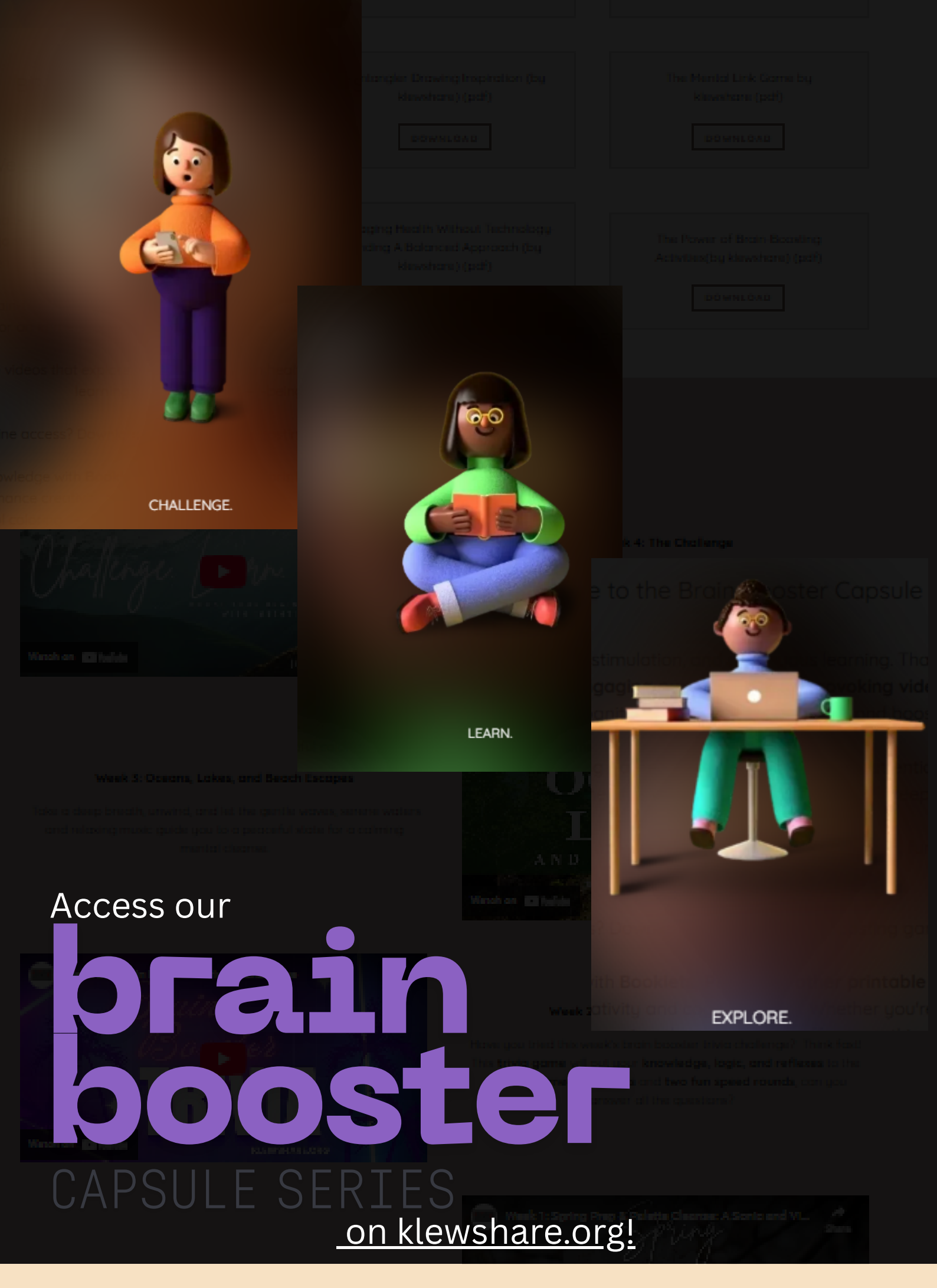

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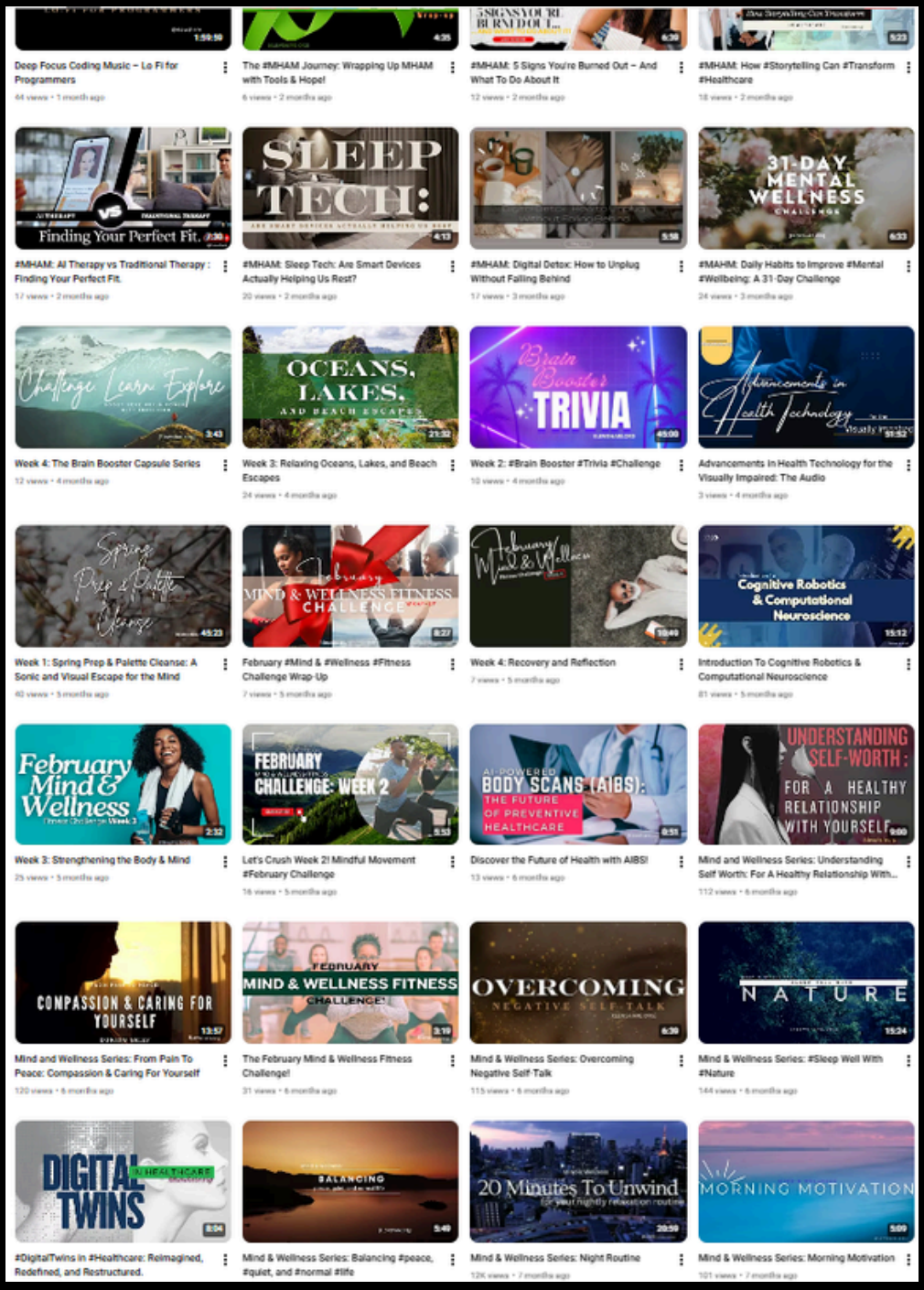

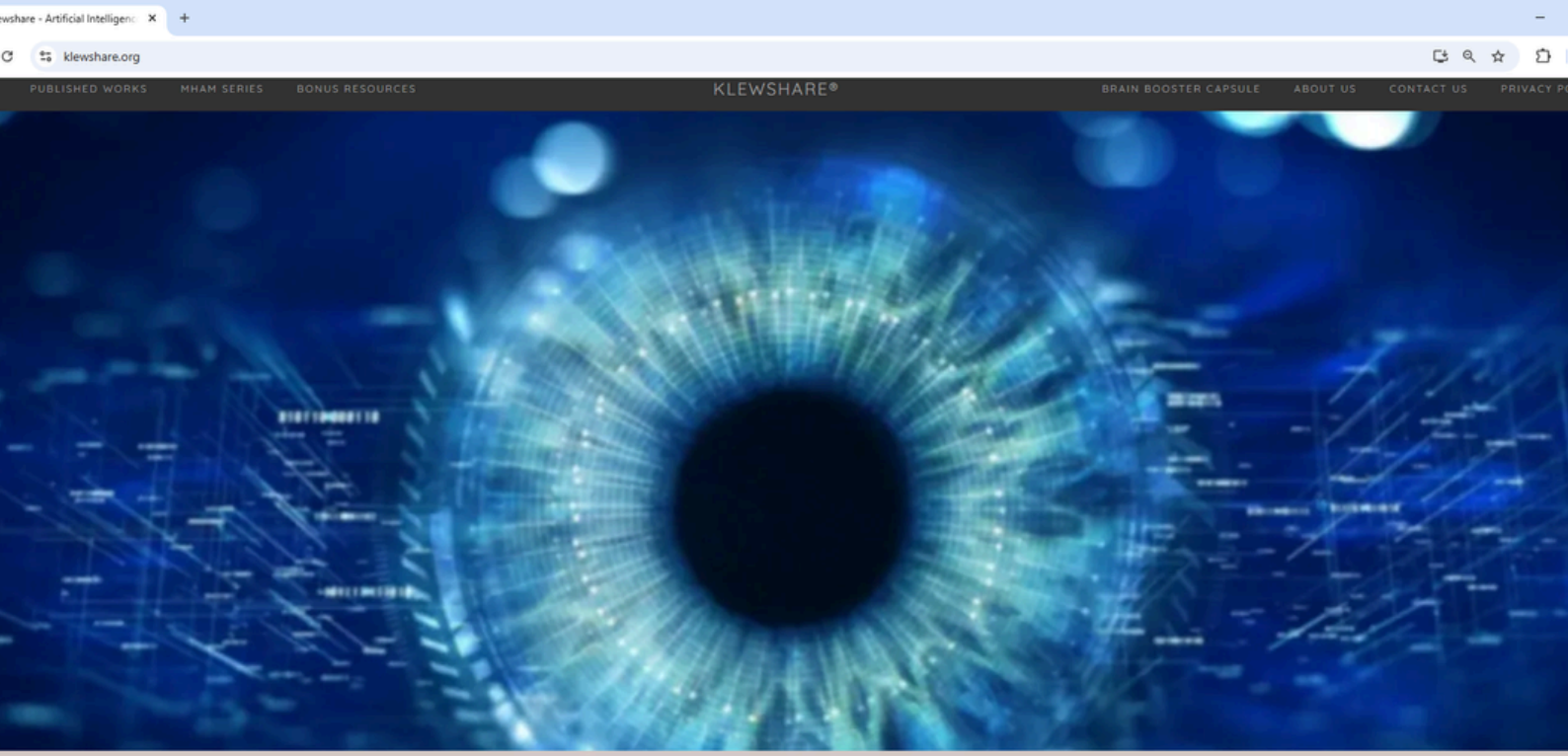

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