

What do we know about **THE FUTURE OF FOOD SYSTEMS IN CENTRAL AND WEST ASIA AND NORTH AFRICA?**

Aymen Frija (ICARDA)

Key messages

- The subregions of Central and West Asia and North Africa (CWANA) will continue to import around 50 percent of domestic food requirements by 2050.
- Natural resources will continue to degrade in the CWANA region until 2050 and beyond.
- Agrifood systems transformation in CWANA can be facilitated by fast-tracking technology transfer approaches, leading to sustainable productivity growth.
- Foresight analyses are needed to generate scenarios of agrifood system transformation in CWANA, with a focus on reducing trade and importation risks related to international market volatility.

RECENT TRENDS AND CHALLENGES

Food systems in Central and West Asia and North Africa (CWANA)¹ are characterized by a subset of well-known and documented dynamics and transformations. The region is recognized for its critical challenges in numerous areas: environmental (dry areas; a high level of degradation of soil, water, and rangelands; a hotspot for climate change); socioeconomic (population growth; gender and other inequities; conflicts; a preponderance of small farms; lack of technology transfer and of investment capacity; and heavy dependence on food imports); and political (political economy and related market biases; low efficiency and effectiveness of programs; and lack of economic incentives for investments) (Shideed, Shomo, and Aw-Hassan 2010). Current and future foresight studies of agrifood systems indicate that marginality and vulnerability in food production and access are already high, mainly due to the following factors:

- Climate change is leading to reduced availability of blue and green water. One-half of the population in the Middle East and North Africa (MENA), a subregion of CWANA, already lives under water stress (Belhaj and Soliman 2021).
- Population growth in CWANA is among the highest in the world, with a total fertility rate of 2.8 in 2021, but is expected to decrease to 2.2 in 2050 (second highest after sub-Saharan Africa), while the region's population is expected to reach 770 million by 2050 (UN 2022). This is expected to intensify social pressure, increase job and food demand, and encourage migration (Belhaj and Soliman 2021; Läderach et al. 2022). However, agricultural productivity rates are not growing at the same pace as population growth (Rosegrant et al. 2017; Fuglie et al. 2019).
- Diets and nutrition are challenging issues in CWANA. Local production – dominated by cereals (wheat in wetter areas and barley in drier areas), legumes (chickpeas, lentils, and fodder) (Frija 2021) – forms the core of the population's diet. But domestic supplies of all these commodities are becoming increasingly unreliable and inadequate.
- Around one-third of calories consumed in MENA originate from subsidized wheat (Belhaj and Soliman 2021; Kruseman et al. 2020, 2021; Frija 2021) with negative impacts of diets on human health (such as obesity) (Agnivesh 2023).
- Malnutrition is another key challenge (Agnivesh 2023). Around 55 million people in MENA are estimated to be undernourished, and around 20 percent of the population is food insecure (Belhaj and Soliman 2021). The numbers of food insecure are particularly high in conflict areas (about 24 million in Yemen, 12 million in Syria, and 4 million in Iraq), while malnutrition is driven by inflation and other economic and financial factors in countries such as Lebanon, Tunisia, and Egypt. Malnutrition imposes long-term economic costs that can reach 3 percent of gross domestic product (GDP) in some poor countries (World Bank 2006).
- Continuous heavy depletion of natural resources – including water (Agnivesh 2023; de Waal et al. 2023; Droogers et al. 2012; Lentz 2021), rangelands (Frija et al. 2023; Sghaier et al. 2024), soils (Bahri et al. 2019), and biodiversity (Sarant 2019) – are also of concern, with implications for long-term sustainability.

LATEST FORESIGHT RESEARCH

Recent foresight studies suggest that CWANA's agrifood challenges can be partly mitigated through more sustainable use of land, soil, and water (Agnivesh 2023; de Waal et al. 2023; Droogers et al. 2012; Lentz 2021). However, water scarcity is expected to continue to adversely impact job opportunities, farm incomes, reliability of agricultural exports, and the ability of vulnerable communities in the region to access domestic water and food at affordable prices (El Kharraz et al. 2012). A World Bank report indicates that by the end of this decade, the amount of water available annually per capita will be below the absolute water scarcity threshold of 500 cubic meters (de Waal et al. 2023). An additional 25 billion cubic meters of water per year will be needed by 2050 to meet the region's needs (de Waal et al. 2023; Droogers et al. 2012). Projections from IFPRI's International Model for

¹ Central and West Asia and North Africa (CWANA) is the term used by CGIAR to refer to the drylands extending from Morocco in North Africa to Central Asia.

Policy Analysis of Agricultural Commodities and Trade (IMPACT) show that blue water consumption will grow by 30 billion cubic meters by 2050, an increase of over 10 percent over 2020 (Rosegrant et al. 2017).

Despite the expected increase in input use in rainfed production systems, water and soil fertility will remain binding constraints for productivity growth in MENA until 2050 (Le Mouël et al. 2016). Deeper transformations of food systems in CWANA will be needed to overcome environmental degradation, institutional inefficiencies, and growing demand (Agnivesh 2023; de Waal et al. 2023; Droogers et al. 2012; Lentz 2021).

Foresight studies suggest the following trends in consumption, diets, and nutrition in most countries of the region (Dupouy and Gurinovic 2020; Frija 2021; Kruseman et al. 2021):

- Per capita wheat consumption is not expected to increase by 2050 (based on an analysis of future trends using historical data). However, expected growth in overall wheat demand in the region will be driven by population growth (Frija 2021). Part of the grain cereals consumption is expected to be replaced by energy-dense foods and livestock and fish proteins (Frija 2021).
- Legume consumption per capita is expected to increase in some countries (such as Tunisia and Turkey) by 2050, but will remain low in terms of relative importance in the overall diet.
- Central Asia is expected to face rising overweight and obesity, micronutrient deficiencies, and diet-related non-communicable diseases (Dupouy and Gurinovic 2020).

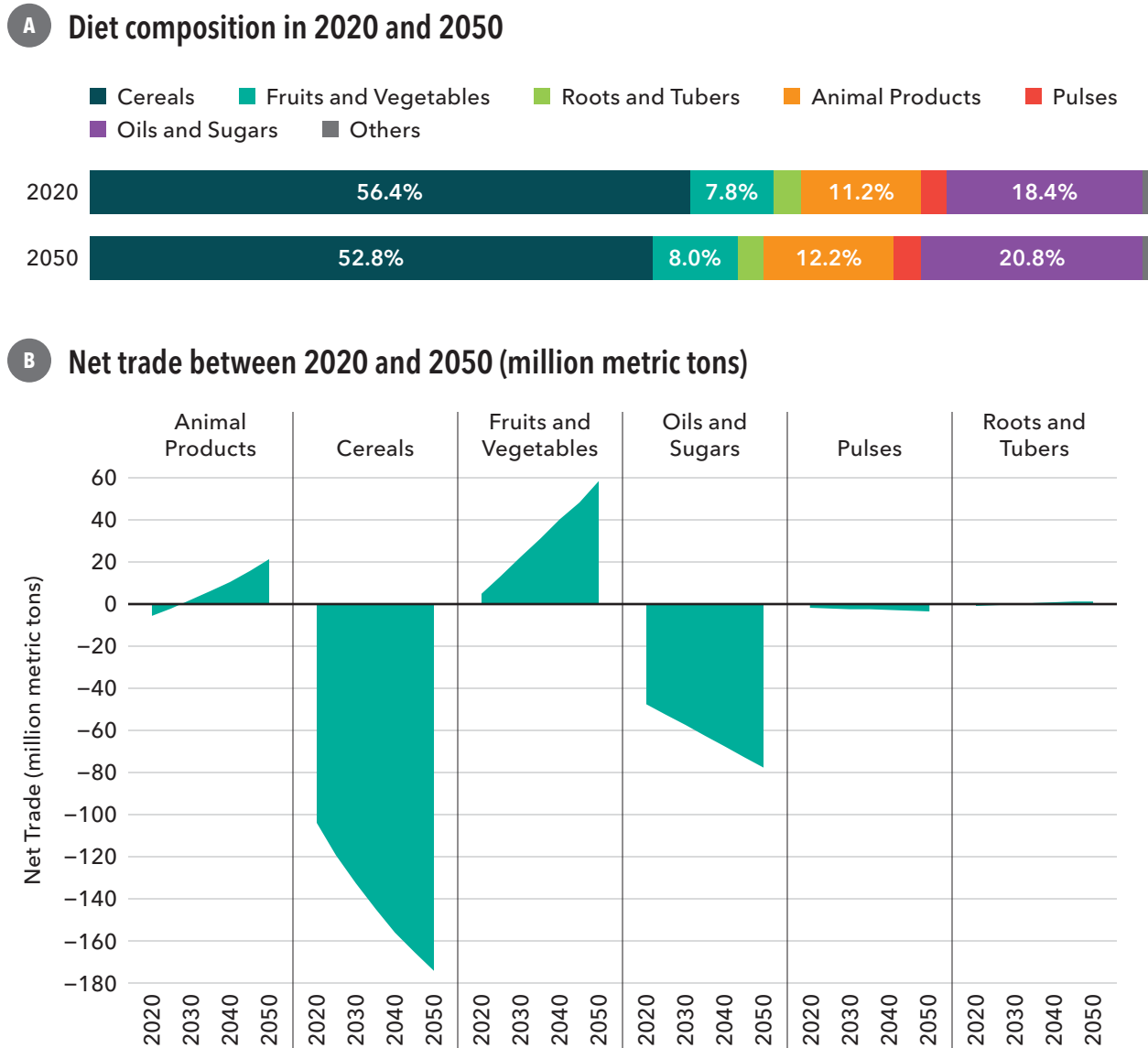
Domestic food supplies in CWANA are insufficient to cover domestic consumption, and supply gaps are filled through substantial imports. Foresight studies show that this situation will persist in the coming few decades (by 2030 and 2050) (Frija 2021; Kruseman et al. 2020, 2021). CWANA's dependence on food imports is expected to grow from 40 percent of domestic food consumption to around 50 percent by 2050 (Le Mouël et al. 2016). Although diet composition is projected to see a decrease in the share of cereals in 2050, the share of oils and sugar is expected to grow, and the region is projected to remain highly dependent on imports for both food groups, according to IMPACT model projections (Figure 1).

Better decision-making to reduce **risks related to importation** from international markets is critical. This can help reduce risks related to dependence on food imports and world market price volatility. Risk reduction can be achieved by reducing yield volatility in major crops, but also by enhancing countries' capacities for world food price prediction and anticipated purchase and storage decision systems and related infrastructure. By doing so, governments can reduce commodity price volatility and stabilize their budgets through better predictability of food imports (Belhaj and Soliman 2021).

Technology transfer for long-term growth of agricultural productivity is also important. Technical progress and increased efficiency are the best option to reduce CWANA's dependence on food imports by 2050. Enhanced technology transfer scenarios (leading to enhanced productivity) remain among the best identified alternatives to mitigate the shortage of domestic food supply (Le Mouël et al. 2016). Most extension systems in the region remain low-performing, lacking holistic innovation systems consistent with agrifood system levels and frameworks. Ryan et al. (2012) suggest that despite achievements in applied research, poorly developed technology transfer systems and weak analytical facilities remain stumbling blocks to the widespread dissemination of accumulated knowledge to farmers. The scope of agricultural innovations not only covers agricultural productivity growth but can lead to economic opportunities and growth, in turn increasing labor market demand, social welfare, and investments. Technology transfer can also support enhanced governance settings for natural resource management, which is a must for the next decades.

KEY GAPS AND OPPORTUNITIES FOR FORESIGHT RESEARCH

Food system resilience is conceptualized from a holistic perspective, encompassing the complexity of the whole food system, including social, economic, and biophysical processes operating at many scales (Tendall et al. 2015). Consistent and holistic R&D approaches to inform future decisions on investments in innovation system functions are lacking, as they should be nested within the broader food system components and aggregates.

FIGURE 1 CWANA diet composition and net trade

Source: Rosegrant et al. 2024.

Note: Results for business-as-usual (BAU) scenario, IMPACT model version 3.4. This scenario assumes population and income trends from SSP2, a middle-of-the-road socio-economic scenario. Climate change shocks are derived from Representative Concentration Pathway (RCP) 7.0 as projected under IPSL's general circulation model.

A significant trend toward exploring more environmentally friendly and socially inclusive **agroecological approaches for sustainable transformation of agrifood systems** is currently evident in the literature and in some key policy arenas. However, data and foresight studies about the prospective costs and benefits of different transformation pathways in CWANA are still scarce. Improved estimates of future costs and benefits of alternative future transformation scenarios generated by foresight studies would be of great value to policymakers in support of the sustainable transition of agrifood systems.

Development of **novel viable financial models and schemes** for supporting the governance and sustainability of agrifood systems at all levels – while supporting productivity enhancement, agroecological transformation, and decentralized natural resources governance – is a key driver of transformation. Alternative sustainable and responsible funding mechanisms and approaches for agricultural modernization and sustainability in the region are needed. Foresight studies can explore the impact of different organizational settings and their impact on financial sustainability for food system transitions.

Social protection measures (safety nets and food aid programs) are being questioned and revised by governments in most CWANA countries. The lack of evidence and accurate assessments to support decision-making in this regard remains a key gap that can be addressed through strategic foresight studies. Social considerations such as the “feminization of agricultural labor” and youth engagement are other important gaps in our understanding of the future of food systems that need to be investigated.

This chapter was supported by the CGIAR Research Initiative on Foresight and the CGIAR Science Program on Policy Innovations. We would like to thank all funders who supported this research through their contributions to the [CGIAR Trust Fund](#).

The author of this chapter is **Aymen Frija**, a Senior Scientist and Agricultural Economist in the Social, Economic, and Policy Research Team at the International Center for Agricultural Research in the Dry Areas (ICARDA).

Related chapters on the future of food system drivers and impacts, regional and national perspectives, food commodities, and foresight tools are available in our [Table of Contents](#).

Citation: Frija, A. 2025. “What Do We Know About the Future of Agrifood Systems in Central West Asia and North Africa?” In *What Do We Know About the Future of Food Systems?*, eds. K. Wiebe and E. Gotor, Chapter 19. Washington, DC: IFPRI. <https://hdl.handle.net/10568/175019>

Photo credit: Vincent Simonneaux/IRD

References

- Agnivesh, H. 2023. "MENA Watch: Region Faces Dire Water Scarcity by 2050." *Global Business Outlook*, August 23. <https://globalbusinessoutlook.com/energy/mena-watch-region-faces-dire-water-scarcity/>
- Bahri, H., M. Annabi, H. Cheikh M'Hamed, and A. Frija. 2019. "Assessing the Long-Term Impact of Conservation Agriculture on Wheat-Based Systems in Tunisia Using APSIM Simulations Under a Climate Change Context." *Science of the Total Environment* 692: 1223-1233. <https://doi.org/10.1016/j.scitotenv.2019.07.307>
- Belhaj, F., and A. Soliman. 2021. "MENA Has a Food Security Problem, But There Are Ways to Address It." *Opinion*, September 25. <https://www.worldbank.org/en/news/opinion/2021/09/24/mena-has-a-food-security-problem-but-there-are-ways-to-address-it>
- de Waal, D., S. Khemani, A. Barone, and E. Borgomeo. 2023. *The Economics of Water Scarcity in the Middle East and North Africa: Institutional Solutions*. Washington, DC: World Bank. <https://doi.org/10.1596/978-1-4648-1739-7>
- Droogers, P., W.W. Immerzeel, W. Terink, J. Hoogeveen, M.F.P. Bierkens, L.P.H. Van Beek, and B. Debele. 2012. "Water Resources Trends in Middle East and North Africa Towards 2050." *Hydrology and Earth System Sciences* 16 (9): 3101-3114. <https://doi.org/10.5194/HESS-16-3101-2012>
- Dupouy, E., and M. Gurinovic. 2020. "Sustainable Food Systems for Healthy Diets in Europe and Central Asia: Introduction to the Special Issue." *Food Policy* 96: 101952. <https://doi.org/10.1016/J.FOODPOL.2020.101952>
- El Kharraz, J., A. El-Sadek, N. Ghaffour, and E. Mino. 2012. "Water Scarcity and Drought in WANA Countries." *Procedia Engineering* 33: 14-29. <https://doi.org/10.1016/J.PROENG.2012.01.1172>
- Frija, A., H. Ouerghemmi, and K.A. Mottaleb. 2021. *Dietary Change in Asia, Sub-Saharan Africa, and North Africa: Historical Changes and Future Food Consumption Perspectives*. ICARDA Policy Brief. ICARDA. <https://hdl.handle.net/20.500.11766/66832>
- Frija, A., M. Sghaier, M. Fetoui, B. Dhehibi, and M. Sghaier. 2023. "Pathways for Improving Rangeland Governance Under Constraining Land Tenure Systems: Application of a Participatory Bayesian Belief Approach." *Land Use Policy* 126: 106519. <https://doi.org/10.1016/J.LANDUSEPOL.2022.106519>
- Fuglie, K., M. Gautam, A. Goyal, and W.F. Maloney. 2019. *Harvesting Prosperity: Technology and Productivity Growth in Agriculture*. Washington, DC: World Bank. <https://doi.org/10.1596/978-1-4648-1393-1>
- Kruseman, G., K.A. Mottaleb, A. Frija, S.D. Gbegbelegbe, S. Bairagi, and M. Springmann. 2021. *Effects of Dietary Change—Synthesis Across the Case Studies*. Texcoco, Mexico: CIMMYT. <https://hdl.handle.net/10883/21821>
- Kruseman, G., K.A. Mottaleb, K. Tesfaye, et al. 2020. "Rural Transformation and the Future of Cereal-Based Agri-Food Systems." *Global Food Security* 26: 100441. <https://doi.org/10.1016/j.gfs.2020.100441>
- Läderach, P., F. Schapendonk, S. Ruckstuhl et al. 2022. *Climate Security in the MENA Region*. Position Paper No. 2022/3. CGIAR FOCUS Climate Security. <https://hdl.handle.net/10568/117616>
- Le Mouël, C., A. Forslund, P. Marty, S. Manceron, and B. Schmitt. 2016. "Sub-Chapter 3.2.7. Climate Change and Dependence on Agricultural Imports in the MENA Region." In *The Mediterranean Region Under Climate Change*, eds. Jean-Paul Moatti and Stéphane Thiébaud, IRD Éditions, 511-517. Marseilles, France: IRD. <https://doi.org/10.4000/books.irdeditions.23862>
- Lentz, E.C. 2021. "Food and Agriculture Systems Foresight Study: Implications for Gender, Poverty, and Nutrition." *Q Open* 1 (1): 1-53. <https://doi.org/10.1093/QOPEN/QOAA003>
- Rosegrant, M.W., T.B. Sulser, S. Dunston, et al. 2024. "Food and Nutrition Security Under Changing Climate and Socioeconomic Conditions." *Global Food Security* 41: 100755. <https://doi.org/10.1016/j.gfs.2024.100755>
- Rosegrant, M.W., T.B. Sulser, D. Mason-D'Croz, et al. 2017. *Quantitative Foresight Modeling to Inform the CGIAR Research Portfolio*. Project Report for USAID. Washington, DC: IFPRI. <https://hdl.handle.net/10568/148186>
- Ryan, J., H. Ibricci, A. Delgado, J. Torrent, R. Sommer, and A. Rashid. 2012. "Significance of Phosphorus for Agriculture and the Environment in the West Asia and North Africa Region." *Advances in Agronomy* 114: 91-153. <https://doi.org/10.1016/B978-0-12-394275-3.00004-3>
- Sarant, L. 2019. "Predicting Climate Change Impact on Afro-Arabian Biodiversity." *Nature Middle East News*, February 7. <https://doi.org/10.1038/NMIDDLEAST.2019.18>
- Sghaier, M., A. Frija, J. Postigo, S. Speelman, V. Alary, and M. Sghaier. 2024. "Assessing Pastoral Reforms Through the Performance of Agro-Pastoral Community-Based Organizations in South Tunisia." *Rangeland Ecology & Management* 98: 49-62. <https://doi.org/10.1016/J.RAMA.2024.07.008>
- Shideed, K.H., F. Shomo, and A. Aw-Hassan. 2010. "Chapter 69 Population Growth and Trends in Food Production and Consumption in the CWANA Region." *Handbook of Agricultural Economics* 4: 3531-3570. [https://doi.org/10.1016/S1574-0072\(09\)04069-9](https://doi.org/10.1016/S1574-0072(09)04069-9)
- Tendall, D.M., J. Joerin, B. Kopainsky, et al. 2015. "Food System Resilience: Defining the Concept." *Global Food Security* 6: 17-23. <https://doi.org/10.1016/j.gfs.2015.08.001>
- World Bank. 2006. *Repositioning Nutrition as Central to Development: A Strategy for Large-Scale Action*. Washington, DC: World Bank. <https://hdl.handle.net/10986/7409>
- UN (United Nations). 2022. *World Population Prospects 2022: Summary of Results*. UN DESA/POP/2021/TR/NO.3. Department of Economic and Social Affairs Population Division, United Nations. https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/wpp2022_summary_of_results.pdf

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

A world free of hunger and malnutrition

IFPRI is a CGIAR Research Center

1201 Eye St, NW, Washington, DC 20005 USA | T. +1-202-862-5600 | F. +1-202-862-5606 | Email: ifpri@cgiar.org | www.ifpri.org | www.ifpri.info

Handle: <https://hdl.handle.net/10568/175019>