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The Right to Adequate Food and Food Security: A Human Rights-Based Framework for Sustainable Food-System Governance

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Abstract

This article examines the relationship between the human right to adequate food, food security, and the governance of contemporary food systems. It argues that international law does not establish a freestanding obligation for States to industrialize food production. Nevertheless, where food processing, preservation, distribution, food safety and related food-system capacities materially affect the availability, accessibility, adequacy or stability of food, their regulation becomes relevant to the progressive realization of the right to adequate food. The study adopts a legal-analytical and normative methodology, drawing primarily on Article 11 of the International Covenant on Economic, Social and Cultural Rights, General Comment No. 12 of the Committee on Economic, Social and Cultural Rights, the FAO Voluntary Guidelines on the Right to Food, and contemporary literature on food systems, nutrition, food safety, sustainability and resilience. The article distinguishes the right to adequate food as a legally protected human right from food security as a multidimensional condition and policy objective. It develops a Right-to-Food-Compatible Food-System Governance Framework based on four substantive dimensions: availability and preservation; accessibility and affordability; adequacy, safety and nutritional quality; and sustainability and resilience. Non-discrimination and accountability operate as cross-cutting requirements. The analysis demonstrates that food-system development contributes to the realization of the right to adequate food only when its benefits are translated into effective, equitable, safe and sustainable access to food. Algeria is used as an illustrative policy context rather than as an empirical case study. The article concludes that food-system governance should move beyond production-centred approaches and integrate human-rights obligations, food-safety regulation, affordability, accountability, sustainability and resilience into coherent public policy.

Keywords: right to adequate food; food security; food-system governance; human rights; food processing; food safety; sustainability; resilience; Algeria.

1. Introduction

Food security is increasingly understood as a property of an entire food system rather than as a simple measure of agricultural output. Food reaches consumers through interconnected stages that include production, storage, preservation, processing, transportation, wholesale and retail distribution, and consumption. A disruption at any point in this chain may affect whether food is physically available, economically accessible, safe, nutritious and continuously obtainable. The legal analysis of food security must therefore take account of the institutional and infrastructural arrangements that connect agricultural production with actual access to food (Food and Agriculture Organization of the United Nations, 2024a; FAO et al., 2024).

Food processing illustrates this broader relationship. Appropriate processing can extend shelf life, reduce post-harvest losses, facilitate transport and distribution, improve food safety, diversify supply and make certain foods available beyond their production season. Processing can also create employment and income, thereby affecting economic access to food (Augustin et al., 2016). At the same time, processing is not inherently beneficial. Poorly regulated processing can diminish nutritional quality, increase exposure to contaminants, intensify environmental pressures, or increase prices in ways that

disproportionately affect low-income households (Vignesh et al., 2024). The contribution of food-system capacity to food security is therefore conditional on governance.

The principal international legal foundation is Article 11 of the International Covenant on Economic, Social and Cultural Rights (ICESCR). Article 11 recognizes the right of everyone to an adequate standard of living, including adequate food, and links the progressive realization of the right to measures concerning production, conservation and distribution of food (United Nations, 1966). Article 11(2) further addresses the fundamental right to be free from hunger and identifies measures concerning methods of production, conservation and distribution, and the dissemination of technical and scientific knowledge, among the means relevant to implementation (United Nations, 1966). These provisions create an important legal bridge between food-system capacities and human-rights obligations.

That bridge should not, however, be overstated. International human rights law does not impose a freestanding obligation on every State to establish or industrialize a particular food-processing sector. The legal obligation is directed toward progressively realizing the right to adequate food and ensuring freedom from hunger (Committee on Economic, Social and Cultural Rights, 1999). Food processing, storage, distribution and related infrastructure are means through which States may pursue that objective when they are relevant to identified food-system constraints. The central legal question is consequently not whether a State has industrialized its food sector, but whether its policies and regulatory arrangements enable people to enjoy adequate food in an effective, equitable, safe and sustainable manner.

Against this background, the article asks: To what extent can a human rights-based governance framework enable States to progressively realize the right to adequate food and strengthen sustainable food security, particularly through the regulation and development of food-system capacities?

The working hypothesis is that food-system capacities can contribute materially to the realization of the right to adequate food when they are embedded in a coherent framework protecting affordability, safety, nutritional adequacy, non-discrimination, sustainability and accountability. Their contribution is not automatic and cannot be measured by production or investment indicators alone.

The article makes three principal contributions. First, it distinguishes the legal concept of the right to adequate food from the broader policy concept of food security. Second, it analyses food-system capacities through the tripartite structure of State obligations to respect, protect and fulfil the right to food (Committee on Economic, Social and Cultural Rights, 1999). Third, it proposes a Right-to-Food-Compatible Food-System Governance Framework organized around four substantive dimensions—availability and preservation; accessibility and affordability; adequacy, safety and nutritional quality; and sustainability and resilience—with non-discrimination and accountability operating across all four. Algeria is used only as an illustrative policy context to demonstrate how the framework may be applied to a national regulatory environment.

2. Methodology and Conceptual Framework

The study adopts a legal-analytical and normative methodology. Its primary materials are international human-rights instruments, interpretive materials of the United Nations treaty bodies, and international policy instruments concerning the right to food and food security. The analysis is complemented by interdisciplinary literature addressing food processing, food safety, food-system resilience, nutrition and sustainability. The purpose is not to establish a statistical causal relationship between industrial capacity and food security, but to determine the legal conditions under which food-system interventions are relevant to the progressive realization of the right to adequate food.

The article uses doctrinal analysis to interpret Article 11 of the ICESCR in conjunction with General Comment No. 12 of the Committee on Economic, Social and Cultural Rights and the FAO Voluntary Guidelines. It then uses normative synthesis to connect legal duties with food-system functions (Committee on Economic, Social and Cultural Rights, 1999; Food and Agriculture Organization of the United Nations, 2005). This approach is appropriate because the central problem is one of legal characterization and governance design: when does investment in processing, preservation, distribution or food safety become a legitimate instrument of human-rights implementation, and what safeguards are required to prevent such policies from producing contrary effects?

2.1. Distinguishing the Right to Adequate Food from Food Security

The right to adequate food is a legally protected human right. Food security is a multidimensional condition and policy objective. The two concepts overlap but should not be treated as interchangeable. Food security is commonly analysed through availability, accessibility, utilization and stability. Contemporary food-system approaches additionally emphasize sustainability, resilience, equity and the institutional conditions that shape who benefits from food-system transformation (FAO et al., 2024; Mkumbukiy et al., 2025).

The distinction matters legally. A country may record high aggregate food availability while significant groups remain unable to afford food. Conversely, a population may have access to calories while suffering from inadequate nutritional quality or unsafe food. The right to adequate food therefore introduces a normative benchmark that cannot be reduced to aggregate supply. General Comment No. 12 explains adequacy in terms that include nutritional sufficiency, cultural acceptability and freedom from adverse substances, while accessibility encompasses both economic and physical access (Committee on Economic, Social and Cultural Rights, 1999). The legal assessment must thus examine outcomes for people, not only capacities of the food sector.

3. The International Legal Architecture of the Right to Adequate Food

The Universal Declaration of Human Rights recognizes, in Article 25, the right to an adequate standard of living, including food (United Nations, 1948). The ICESCR gives this protection binding treaty form for States parties through Article 11 (United Nations, 1966). The Covenant requires States to take appropriate steps, using the maximum of available resources and subject to progressive realization, while the duty to take steps is not postponed until a State has reached a particular level of economic development. The right is also connected to the prohibition of discrimination and to other rights whose enjoyment affects food access, including health, social security, work and participation in public affairs.

3.1. Recognition of the Right to Adequate Food

General Comment No. 12 is particularly important because it clarifies that the right to adequate food is not simply a right to a minimum quantity of calories. Adequacy incorporates nutritional and cultural dimensions, while accessibility requires both economic and physical access. The Committee also identifies State obligations to respect, protect and fulfil (Committee on Economic, Social and Cultural Rights, 1999). This structure is useful for analysing food-system governance because many food-system decisions are made by private actors, while their consequences depend heavily on public regulation, infrastructure, standards and social policy.

Article 11(2)(a) is also significant because it expressly refers to methods of production, conservation and distribution of food and to the dissemination of technical and scientific knowledge (United Nations, 1966). These references demonstrate that the Covenant recognizes food-system organization as relevant to the eradication of hunger. They do not, however, prescribe a particular industrial model. A State may choose different institutional and technological pathways, provided that its choices are compatible with its human-rights obligations and contribute to effective realization of the right.

3.2. Food-System Capacities and the Dimensions of Food Security

A rights-based analysis can translate the broad dimensions of food security into governance questions. Four dimensions are particularly useful for evaluating food-system capacities: availability and preservation; accessibility and affordability; adequacy, safety and nutritional quality; and sustainability and resilience. These dimensions should not be viewed as independent silos. A policy that improves one while seriously damaging another may fail the overall rights-based assessment.

3.2.1. Availability and Preservation

Processing and preservation can strengthen availability by reducing losses between harvest and consumption and by extending the period during which food remains usable. Storage, cold chains, packaging and appropriate processing technologies can be especially important where climatic conditions, distance or infrastructure make fresh distribution difficult. In legal terms, these capacities may form part of the positive measures through which States address structural constraints on food availability (Augustin et al., 2016; Sokołowski, 2026).

Yet the availability dimension is not equivalent to maximizing production. A processing strategy that depends heavily on imported inputs may increase vulnerability to external shocks. Similarly, concentration of processing capacity in a small number of firms may create bottlenecks. The relevant governance question is therefore whether the food-system intervention increases reliable availability without creating new structural vulnerabilities.

3.2.2. Accessibility and Affordability

Economic accessibility is central to the right to adequate food. A food system may generate abundant supply while leaving households unable to purchase adequate food because of high prices, income insecurity or unequal distribution. Processing can sometimes lower unit costs, reduce losses and stabilize seasonal supply, but it can also add costs and market power. The human-rights assessment must therefore examine the distributional effects of food-system policies, including their effects on low-income households and geographically isolated communities (Committee on Economic, Social and Cultural Rights, 1999; FAO et al., 2024).

Physical accessibility is equally important. Roads, storage facilities, transport networks, markets and retail infrastructure can determine whether food that exists in national supply chains actually reaches people. Food-system governance should consequently treat infrastructure and distribution as part of the practical conditions for exercising the right, rather than as purely economic matters.

3.2.3. Adequacy, Safety and Nutritional Quality

Adequacy requires more than the physical presence of food. Food must be safe and nutritionally appropriate. Food safety regulation, inspection, traceability, hygiene standards, laboratory capacity, labelling and consumer protection are therefore directly relevant to the right to food. The FAO and Codex Alimentarius emphasize food safety as a basic condition for realizing the human right to food (Food and Agriculture Organization of the United Nations, 2024b). This creates a strong rationale for regulating private food-system actors rather than treating food safety solely as a matter of voluntary corporate responsibility.

Nutritional adequacy also requires attention to the composition of processed foods. Processing can preserve nutrients, improve digestibility and enable fortification, but certain forms of processing may contribute to diets high in salt, sugar or unhealthy fats. A rights-based framework should therefore avoid both technological optimism and technological rejection. The relevant question is whether food-system practices support adequate, safe and nutritious diets consistent with health and cultural acceptability (Augustin et al., 2016; Vignesh et al., 2024).

3.2.4. Stability, Sustainability and Resilience

Food security includes a temporal dimension: access to adequate food should not collapse whenever a shock occurs. Climate events, geopolitical tensions, pandemics, market disruptions and logistical failures can expose weaknesses in food

supply chains. Resilient food systems require diversified sources, adequate storage, adaptive infrastructure, institutional coordination and the capacity to respond to shocks (Mkumbukiy et al., 2025).

Sustainability adds an intergenerational dimension. Food-system policies that degrade soil, water, biodiversity or ecosystems may improve short-term availability while undermining future access to food. Accordingly, sustainability is not merely an environmental preference; it can be relevant to the long-term realization of economic and social rights. The appropriate governance benchmark is a food system capable of meeting present nutritional needs without systematically eroding the ecological and institutional foundations required for future food access (United Nations, 2015; Naheed & Rukhsana, 2024).

4. State Responsibility and the Governance of Food-System Actors

The tripartite structure of respect, protect and fulfil provides a practical legal framework for evaluating State action across the food system. It is especially useful because food production, processing, distribution and retail are often carried out by private actors. The existence of private participation does not remove the State's responsibility to establish an adequate regulatory environment (Committee on Economic, Social and Cultural Rights, 1999).

4.1. The Obligation to Respect

The obligation to respect requires States to refrain from measures that arbitrarily interfere with existing access to adequate food. In food-system governance, this may require attention to the foreseeable effects of regulatory, fiscal, trade, industrial and agricultural measures on vulnerable groups. A reform intended to modernize food markets, for example, should not be assessed solely through investment or efficiency indicators if it predictably reduces access to essential food for particular groups without adequate safeguards.

4.2. The Obligation to Protect

The obligation to protect requires States to regulate third parties whose conduct may impair the enjoyment of the right. Food safety, consumer protection, labelling, traceability, competition policy and environmental regulation are therefore human-rights-relevant functions. Effective regulation is particularly important where market concentration allows large actors to influence prices, supply, product composition or distribution channels (Food and Agriculture Organization of the United Nations, 2024b).

Protection also requires institutional capacity. Rules that cannot be inspected, enforced or monitored may provide little practical protection. States therefore need competent food-control authorities, reliable laboratories, transparent standards, complaint mechanisms and proportionate sanctions. Accountability should extend across the supply chain where risks to food safety or access are foreseeable.

4.3. The Obligation to Fulfil

The obligation to fulfil involves positive measures. Depending on national circumstances, such measures may include investment in storage and transport infrastructure, support for research and innovation, assistance to small and medium-sized enterprises, extension services, social protection and programmes that improve food access. Public intervention may also be justified where markets systematically fail to provide essential infrastructure or where particular regions face persistent food-system constraints (Food and Agriculture Organization of the United Nations, 2005).

The fulfilment obligation does not mean that every State must pursue industrialization for its own sake. The legal test is functional: is the measure necessary or reasonably capable of improving people's effective access to adequate food, and is it designed and implemented consistently with equality, safety, sustainability and accountability? A State may satisfy its obligations through different combinations of public infrastructure, private investment, regulation, social policy and community-based initiatives.

5. A Right-to-Food-Compatible Food-System Governance Framework

The framework proposed in this article converts the legal analysis into a governance model. It does not prescribe a single institutional structure. Instead, it provides a set of criteria against which food-system interventions can be assessed. The framework is intended to prevent a narrow production-centred understanding of food security and to connect economic and technological interventions with human-rights outcomes.

5.1. Availability and Preservation

The first dimension asks whether an intervention improves reliable availability and reduces avoidable losses. Relevant measures may include storage, cold-chain infrastructure, preservation technologies, local processing capacity, diversification of supply and emergency reserves. The evaluation should consider not only aggregate volumes but also regional distribution, seasonality and exposure to disruptions (Augustin et al., 2016; Sokołowski, 2026).

5.2. Accessibility and Affordability

The second dimension asks whether the intervention improves physical and economic access. This requires analysis of prices, household purchasing power, transport costs, market concentration and regional inequalities. Public support for food industries should be designed so that increased productive capacity translates into meaningful access rather than merely higher aggregate output or corporate revenues.

5.3. Adequacy, Safety and Nutritional Quality

The third dimension requires food-system interventions to comply with food-safety standards and support nutritional adequacy. This includes controls over contaminants, hygiene, traceability, labelling, product composition and misleading

claims. Public authorities should also consider whether industrial and processing policies encourage healthy and culturally acceptable food environments (Food and Agriculture Organization of the United Nations, 2024b; Vignesh et al., 2024).

5.4. Sustainability and Resilience

The fourth dimension evaluates whether food-system development strengthens the capacity to withstand shocks while preserving environmental resources. Diversification, efficient resource use, climate adaptation, renewable-energy integration where appropriate, local capacity and risk management may improve resilience. Sustainability assessments should consider the full life cycle of food-system interventions rather than focusing only on short-term economic gains (Mkumbukiy et al., 2025; Naheed & Rukhsana, 2024).

5.5. Non-Discrimination and Accountability as Cross-Cutting Requirements

Non-discrimination and accountability cut across all four dimensions. Food-system benefits should be accessible without discrimination, and the burdens of transition should not be disproportionately imposed on groups already facing economic or physical barriers. Particular attention may be required for low-income households, rural populations and other groups experiencing structural disadvantages in food access (Committee on Economic, Social and Cultural Rights, 1999).

Accountability requires measurable objectives, transparent decision-making, monitoring, complaint mechanisms and access to effective remedies. It also requires governments to be able to explain why a particular intervention was selected, what rights-related risks were identified, and how adverse effects will be mitigated. This transforms food-system governance from a purely technical exercise into a process capable of public scrutiny.

5.6. From Food-System Capacity to Rights-Compatible Governance

The framework can be operationalized through a sequential assessment. First, the State should identify the specific food-system constraint: loss, insufficient storage, high prices, unsafe products, weak distribution, nutritional inadequacy or exposure to shocks. Second, it should determine whether the proposed intervention is necessary and proportionate to that constraint. Third, it should assess effects on affordability, safety, nutrition, sustainability and vulnerable groups. Fourth, it should establish monitoring indicators and accountability mechanisms before implementation is treated as successful.

This sequencing reinforces a central proposition: modernization is a means, not an end. A new processing facility, investment programme or technological upgrade cannot be considered a rights-based success simply because it increases capacity. Its significance depends on whether that capacity is converted into improved enjoyment of the right to adequate food. The ultimate benchmark is therefore human access to sufficient, safe, nutritious, affordable, culturally acceptable and sustainable food (Committee on Economic, Social and Cultural Rights, 1999; Food and Agriculture Organization of the United Nations, 2005).

6. Discussion

The analysis demonstrates that the relationship between food-system development and the right to adequate food is conditional rather than automatic. Food processing, preservation and distribution can provide important capabilities, but their human-rights significance depends on the regulatory and institutional environment in which they operate. This finding challenges approaches that equate food security with production growth alone (Augustin et al., 2016; FAO et al., 2024).

A production-centred approach can overlook affordability, food safety and distributional inequality. It can also underestimate the risks created by excessive dependence on concentrated supply chains or imported inputs. Conversely, a rights-based approach does not reject markets or industrial development. It asks that economic and technological instruments be evaluated against legally relevant outcomes for people. This creates space for productive investment while preventing economic efficiency from becoming the sole measure of policy success.

The framework also reveals the cross-sectoral nature of food rights. Food-system governance intersects agriculture, industry, health, trade, environment, competition, consumer protection, infrastructure and social protection. Fragmented policies can produce contradictory results: industrial subsidies may increase production while environmental policies are weakened; trade measures may protect domestic producers while raising consumer prices; or food-safety standards may be formally strong but poorly enforced. A rights-compatible framework encourages coordination around a common outcome: effective enjoyment of adequate food.

The study has limitations. It is primarily doctrinal and normative and does not provide a statistical test of the causal effects of specific food-industry interventions. The proposed framework should therefore be understood as an analytical and governance tool rather than a rigid universal formula. Future research could apply the criteria comparatively across States, sectors and food-system interventions, and could develop indicators capable of measuring the relationship between food-system investments and concrete rights outcomes.

7. Algeria as an Illustrative Policy Context

Algeria provides a useful illustrative context because food-system governance involves agricultural policy, consumer protection, food safety, industrial development and efforts to strengthen domestic supply chains. Law No. 08-16 of 3 August 2008 on Agricultural Orientation provides an important legal reference for agricultural policy (Algeria, 2008). Law No. 09-03 of 25 February 2009 on Consumer Protection and Repression of Fraud, as amended by Law No. 18-09 of 10 June 2018, provides a regulatory basis relevant to food safety and consumer protection (Algeria, 2009; Algeria, 2018).

The purpose of referring to these instruments is not to present Algeria as an empirical case study or to claim that its legal framework fully implements the proposed model. Rather, Algeria illustrates how the framework can structure legal and policy

assessment. A food-processing or agricultural intervention can be examined by asking five questions: Does it address a concrete constraint on availability or preservation? Does it improve physical or economic access? Does it strengthen safety and nutritional adequacy? Does it improve sustainability or resilience? And are its benefits and burdens distributed without discrimination and subject to effective accountability?

These questions can help connect sectoral policy to the right to adequate food. They also avoid a common conceptual error: assuming that any increase in domestic food production or processing necessarily constitutes progress toward food security. Where investment improves storage, reduces losses, stabilizes prices, strengthens safety controls or diversifies supply, its contribution may be significant. Where it increases capacity without improving access, or creates new environmental, nutritional or distributional harms, the human-rights assessment becomes more critical (Sokołowski, 2026; Mkumbukiy et al., 2025).

8. Conclusion

The right to adequate food cannot be realized through agricultural production alone. It depends on a wider set of legal, economic, technological, environmental and institutional conditions that determine whether food is available, accessible, adequate, safe and continuously obtainable. Food processing, preservation, storage and distribution can form part of those conditions and can support food security and progressive realization of the right when appropriately governed (Augustin et al., 2016; Committee on Economic, Social and Cultural Rights, 1999).

International law does not establish a freestanding obligation to industrialize food production. The stronger legal proposition is functional: where food-system capacities materially affect the enjoyment of the right to adequate food, States should assess and govern those capacities in accordance with their obligations to respect, protect and fulfil the right. This requires attention not only to production but also to affordability, safety, nutrition, sustainability, resilience, equality and accountability.

The Right-to-Food-Compatible Food-System Governance Framework proposed here provides a practical way to operationalize that approach. Its four substantive dimensions—availability and preservation; accessibility and affordability; adequacy, safety and nutritional quality; and sustainability and resilience—are reinforced by non-discrimination and accountability. Together they shift the benchmark from the size of the food sector to the quality and equity of the food outcomes it produces.

The broader implication is that food-system modernization should be evaluated by its contribution to people's rights rather than by investment or production indicators alone. A food system is successful, from a human-rights perspective, when it enables people to obtain sufficient, safe, nutritious, affordable, culturally acceptable and sustainable food on a stable basis. That is the point at which food-system governance and the right to adequate food become parts of the same legal and policy project.

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