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Food Security under Armed Conflict



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Global Knowledge Landscape and Public Attention
to Social, Economic, and Humanitarian Dimensions

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V&R unipress

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ISBN 978-3-8471-2032-2

ISBN 978-3-8470-2032-5 (PDF)

ISBN 978-3-7370-2032-9 (ELIBRARY)

DOI <https://doi.org/10.14220/9783737020329>

Bibliographic information published by the Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available on the Internet at <https://dnb.dnb.de>.

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Questions about General Product Safety Regulation: productsafety@degruyterbrill.com

Printing: CPI books GmbH, Leck

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Introduction

Food security has re-emerged as a central global challenge in the twenty-first century, shaped by the cumulative effects of climate change, economic volatility, demographic pressures, and geopolitical instability. While food security has long been recognised as a multidimensional concept encompassing availability, access, utilisation, and stability, recent crises have exposed the fragility of global food systems and the uneven capacity of countries to absorb external shocks. In this context, food security is no longer solely an agricultural or humanitarian concern but a systemic issue intertwined with macroeconomic stability, social cohesion, and national security.

Armed conflict is among the most severe and complex shocks to food systems, simultaneously disrupting production, logistics, markets, and household livelihoods. Modern conflicts increasingly affect globally integrated agri-food supply chains rather than isolated national systems, amplifying spillover effects across regions and income groups. The recent escalation of large-scale military conflict in Eastern Europe has demonstrated how localised hostilities can rapidly translate into global food price volatility, fertiliser shortages, and heightened food insecurity in import-dependent economies, particularly in the Global South.

Beyond material disruptions, armed conflict also reshapes informational environments and collective perceptions of risk. Public attention to food security intensifies during periods of crisis, reflected in digital traces such as online search behaviour, media coverage, and policy discourse. These attention dynamics are not neutral: they influence political prioritisation, emergency responses, and international cooperation. However, systematic empirical evidence on how public attention to food security evolves during armed conflict, and how it interacts with scientific knowledge production, remains limited.

At the same time, the scientific community has responded to conflict-induced food insecurity with a rapidly expanding body of research. Studies addressing supply-chain disruptions, price transmission, vulnerability mapping, and policy responses have proliferated, yet this literature remains fragmented across disciplines and methodological traditions. Bibliometric evidence suggests that conflict-related food security research exhibits strong temporal clustering around major geopolitical events, raising questions about the responsiveness, sustainability, and thematic evolution of scientific output under crisis conditions.

Food security has long been conceptualised as a multidimensional phenomenon shaped by structural, environmental, political, and socio-economic

forces. Early political-economy approaches highlighted the strategic role of food in international relations, trade policy, and national security, demonstrating that food availability and access are deeply embedded in power structures and governance regimes (Hopkins & Puchala, 1978; Taylor, 1966). Subsequent historical analyses of wartime economies revealed how food provisioning, rationing systems, and trade reorientation became central elements of state resilience during large-scale conflicts, particularly in Europe during the twentieth century (Smith, 1947a; Smith, 1947b; Teuteberg, 2016; Cox, 2023).

The relationship between armed conflict and food insecurity has been extensively documented across diverse historical and geographical contexts. Empirical evidence demonstrates that violent conflict disrupts agricultural production, market functioning, and household coping mechanisms, thereby increasing famine vulnerability and malnutrition risks (de Goyet et al., 1978; Hendrickson et al., 1998; De Waal, 2018; Sitnicki et al., 2024a). Health-oriented studies further reveal that war-induced food deprivation produces long-term physiological and intergenerational effects, including adverse birth outcomes, metabolic disorders, and reduced human capital accumulation (Ravelli et al., 1976; Toverud, 1957; Pedersen, 2002).

Beyond direct caloric shortages, conflict reshapes food systems through environmental degradation, biodiversity loss, and ecosystem disruption. Research on fisheries, agriculture, and pollination systems demonstrates that war and post-war transformations accelerate ecological stress, undermining the sustainability of food supply chains (Pauly et al., 2005; Robinson & Sutherland, 2002; Pimenow et al., 2025a; Ollerton et al., 2014; Moldavan et al., 2023). These findings complement broader sustainability-oriented perspectives that link agricultural intensification, soil and water management, and environmental externalities to long-term food security outcomes (Finkel, 2018; Wolfe & Patz, 2002; Patel, 2013; Moldavan et al., 2024; Zolotnytska et al., 2025).

Recent scholarship has placed particular emphasis on the Russian invasion of Ukraine as a systemic shock to global food security. Quantitative and modelling-based studies document sharp increases in food prices, fertiliser shortages, and supply-chain disruptions affecting both exporting and importing countries (Abay et al., 2023; Lin et al., 2023; Jagtap et al., 2022). These effects extend far beyond the immediate conflict zone, intensifying food insecurity in vulnerable regions such as Africa and parts of Asia, where dependence on grain imports amplifies exposure to geopolitical risk (Ben Hassen & El Bilali, 2022; Behnassi & El Haiba, 2022; Boon et al., 2025).

The macroeconomic and institutional transmission channels of war-related food shocks have also received increasing attention. Research demonstrates that conflict-driven trade disruptions, currency instability, and employment

shocks interact with food systems, reinforcing broader patterns of economic insecurity (Dobrovolska et al., 2024; Tsymbal & Demediuk, 2025; Megbowon & Zerihun, 2025). Business-level analyses further show that firms operating under extreme conditions adapt unevenly, with implications for food availability, distribution, and affordability (Sitnicka & Serhiiienko, 2025). These findings underscore the interconnectedness of food security, economic security, and institutional resilience during armed conflict.

Parallel to material disruptions, crises profoundly reshape public awareness and behavioural responses related to food. Digital-trace studies using Google Trends demonstrate that pandemics and geopolitical shocks trigger surges in public attention to food availability, nutrition, and sustainability (Mayasari et al., 2020; Portugal-Nunes et al., 2022; Figiel et al., 2023). Similar approaches applied to urban sustainability and smart-city agendas confirm that public interest responds rapidly to external shocks, suggesting that online search behaviour constitutes a valuable proxy for collective risk perception (Hrytsenko et al., 2024). However, the specific dynamics of public attention to food security under armed conflict remain underexplored.

Scientific knowledge production itself exhibits crisis-sensitive dynamics. Bibliometric analyses reveal that food security research intensifies during periods of global disruption, with thematic shifts toward resilience, governance, and sustainability (Abbasov & Gurbazade, 2025; Atashov et al., 2025; Guliyev et al., 2024a). Government policy, institutional design, and demographic pressures emerge as dominant research clusters, reflecting the growing recognition of food security as a governance challenge rather than a purely agricultural issue (Guliyev et al., 2024b). Related bibliometric studies on digitisation, transparency, national security, and war economics further confirm the acceleration and concentration of scientific output around major geopolitical events (Zámek & Zakharkina, 2024; Zozulinsky, 2024; Pimenow et al., 2025a).

Despite these advances, significant gaps remain in understanding the interaction between public attention and scientific discourse on food security during armed conflict. Existing studies typically examine either material food-system disruptions or research trends in isolation, overlooking feedback mechanisms between societal concern, academic agendas, and policy responses. Broader literatures on migration, displacement, and post-conflict reconstruction suggest that governance failures and information asymmetries play a decisive role in shaping crisis outcomes (Betts, 2013; Weinthal et al., 2014; Watts, 2018; Pimenow et al., 2025b), yet these insights are rarely integrated into food security analyses.

The literature demonstrates that food security during armed conflict is a multidimensional and dynamic phenomenon, shaped by historical legacies, environmental constraints, economic structures, public perceptions, and scientific knowledge production. While substantial progress has been made in documenting individual dimensions of this nexus, an integrated analytical framework linking public attention, scientific output, and conflict-driven food insecurity remains largely absent. Addressing this gap provides the conceptual and empirical foundation for the present monograph.

This monograph addresses these gaps by integrating three analytical dimensions that are rarely examined jointly: the conceptual foundations of food security, public attention dynamics during armed conflict, and the evolution of global scientific discourse. By combining indicator-based analysis, digital trace data, and bibliometric methods, the study advances a comprehensive framework for understanding how food security is perceived, studied, and prioritised under conditions of systemic stress.

Methodologically, the monograph adopts an interdisciplinary and data-driven approach. It draws on internationally harmonised food security indicators, large-scale Google Trends data to proxy public attention, and bibliographic databases to map scientific production and collaboration networks. Advanced statistical techniques, including correlation analysis, lead-lag structures, autoregressive distributed lag models, and causality testing, are employed to uncover dynamic interactions between public attention and academic research activity.

The empirical focus on the period of armed conflict enables the identification of both immediate and delayed responses in public interest and scientific output. This temporal perspective is critical for distinguishing short-term attention shocks from more persistent structural changes in research agendas and policy discourse. Furthermore, the cross-country dimension allows for the assessment of heterogeneity in attention–science interactions, reflecting differences in exposure to conflict, institutional capacity, and food system resilience.

By situating food security at the intersection of conflict, public attention, and scientific knowledge production, this monograph contributes to both academic debate and policy practice. It provides evidence-based insights into how crises reshape research priorities and public concern, highlighting the feedback mechanisms that influence policy responses. Ultimately, the study aims to support more anticipatory, coordinated, and knowledge-driven approaches to safeguarding food security in an increasingly unstable global environment.

Conceptual Foundations of Food Security: Evolution, Dimensions, and Governance

1.1 Definitions of Food Security across Its Four Pillars: Availability, Access, Utilisation, and Stability

Food security is most widely defined as a condition in which all people, at all times, can obtain sufficient, safe, and nutritious food consistent with dietary needs (and commonly, preferences) to support an active and healthy life. This framing originates from the 1996 World Food Summit. It is reiterated in subsequent multilateral guidance, which also makes explicit that the concept is multidimensional and must be assessed at the population, household, and individual levels. In the UN system's food-security governance architecture, the Committee on World Food Security further formalises this definition by emphasising that it rests on four interdependent pillars (availability, access, utilisation, and stability) and that the nutritional dimension is integral rather than optional (FAO, 1996).

In the earlier literature and policy debates, food security was often defined in largely macro and supply-focused terms. The 1974 World Food Conference definition, for instance, centred on the availability and stability of world food supplies and the need to buffer fluctuations in production and prices, reflecting concerns about aggregate shortages and market volatility rather than household deprivation. This “food-supply security” framing treated national and global stocks, production, and prices as the primary objects of analysis, implicitly assuming that sufficient supply would translate into adequate consumption (FAO, 2003).

From the early 1980s onward, influential scholarship and subsequent institutional work shifted the definitional centre of gravity towards access and distribution, recognising that hunger can persist even when food is available. FAO's 1983 formulation explicitly added physical and economic access for “all people at all times” (FAO, 2003). The World Bank (1986) popularised a closely related definition, focusing on access to sufficient food for an active, healthy life, while distinguishing between chronic and transitory insecurity. In parallel, Sen's entitlement approach reframed famine and hunger as outcomes of entitlement failure, a collapse in people's command over food via production,

labour, trade, or transfers, rather than a simple decline in aggregate availability (Sen, 1981).

A third, now dominant, definitional strand consolidates these ideas into the widely used definition from the World Food Summit (FAO, 1996), which integrates adequacy, safety, and nutrition. It explicitly applies across individual, household, national, regional, and global levels. Subsequent refinements (e.g., early 2000s FAO wording) add social access alongside physical and economic access, reinforcing that exclusion, discrimination, and social constraints can be as limiting as income or supply. Academic syntheses describe this evolution as a set of conceptual shifts, from national to household/individual focus, from “food first” to livelihoods, and from purely objective indicators to incorporating people’s own experiences of insecurity, without abandoning the four-pillar logic that underpins most contemporary usage (FAO, 2003).

Definitions also diverge depending on whether the emphasis is on food alone or the broader goal of nutrition. Pinstrup-Andersen argues that “food security” has been used in multiple ways and can serve as a practical welfare concept at household and individual levels, but notes that if nutritional security is the target, access-to-food measures should be complemented by access to clean water and sanitation. Related strands in public-health and monitoring traditions (e.g., the LSRO-based US definitions) define food security not only as having enough nutritionally adequate and safe food, but also as being able to obtain it in socially acceptable ways. At the same time, research on household food insecurity experience highlights recurring definitional domains, such as worry/uncertainty, compromised quality, reduced quantity, and social unacceptability, as core features that many experiential measures aim to capture (Pinstrup-Andersen, 2009).

More recent scientific work extends the definitional conversation by foregrounding time, dynamics, and systems. Measurement-oriented scholarship stresses that food security is conceptually “elusive” and multidimensional, motivating definitions that explicitly incorporate stability over time and the capacity to withstand shocks. In this vein, resilience-based approaches argue that food security should be understood (and measured) as the ability to remain or become food secure in the face of risk, aligning the definition more tightly with probabilistic well-being dynamics. Complementing this, food-systems approaches situate food security outcomes within the full chain of activities (production, storage, processing, trade, and consumption), while a growing open-access debate proposes formally expanding the framework beyond the four pillars to include agency and sustainability, reflecting concerns about power, inequality, and long-run ecological viability in food systems (Barrett, 2010).

The availability pillar refers to whether enough food of appropriate quality is physically present in a country or locality through domestic production, imports, and (where relevant) food assistance. Authoritative formulations treat availability as the “supply side” of food security, shaped by the level of agricultural output, stockholding, and net trade, and therefore sensitive to shocks affecting production systems and supply chains. This pillar is necessary but not sufficient: a food system can be well-supplied while substantial parts of the population remain food-insecure (FAO, 2006).

A central clarification in academic usage is that food security is not equivalent to food availability, as hunger and deprivation can arise from distributional and institutional failures, even when markets are well-supplied. The entitlement perspective highlights why access to food depends on the resources, rights, and exchange possibilities that people can command, making employment shocks, price spikes, conflict, and governance breakdowns directly relevant to the concept of food security. At the same time, the terminology increasingly embeds nutrition-sensitive considerations: food security is best interpreted as a people-centred concept that must be read alongside health-related “utilisation” conditions (including food safety, care practices, and the enabling environment of water and sanitation), and it is treated in the measurement literature as a multidimensional latent condition that cannot be captured by any single indicator (Sen, 1981).

The access pillar assesses whether individuals and households can actually acquire available food, considering both economic factors (income, purchasing power, prices) and physical factors (market access, infrastructure, mobility, security). FAO guidance links access to the resources and “entitlements” people can command under prevailing legal, social, and economic arrangements, which is why poverty, inequality, and market failures can generate food insecurity even when aggregate supplies are ample. In policy terms, access therefore foregrounds livelihoods, social protection, and functioning markets as core determinants of food security outcomes (FAO, 2006).

The utilisation pillar addresses how food translates into nutrition and health, not merely calories consumed. It encompasses dietary quality and diversity, food safety, preparation and feeding practices, as well as the conditions that enable the body to absorb and utilise nutrients, especially access to safe water, sanitation, and healthcare services. In authoritative definitions, utilisation explicitly brings “non-food inputs” into the food-security concept, aligning the pillar with nutrition-sensitive approaches that link agrifood systems to public health and human development (FAO, 2006).

The stability pillar introduces the time dimension: populations, households, and individuals should not face recurring or sudden loss of availability, access,

or utilisation due to shocks (economic crises, conflict, climatic extremes) or predictable seasonal cycles. FAO guidance commonly distinguishes chronic from transitory food insecurity to reflect this temporal logic and underscores that stability effectively “covers” the other three pillars over time; food security requires all four pillars to hold simultaneously and consistently. Recent CFS/HLPE discussions also note that many contemporary frameworks complement the four pillars by focusing on agency and sustainability. However, the four-pillar structure remains the core definitional scaffold for organising indicators and composite indices in empirical work (FAO, 2006).

1.2 Core Indicators of Food Security

Core food-security indicators are typically organised to reflect different pillars and levels of analysis, because no single metric can robustly capture the full concept. Outcome indicators (what people actually experience or consume) are therefore routinely combined with “enabling-environment” measures (such as prices, affordability, and access conditions) to triangulate conditions and trends. This plural approach is strongly supported in the measurement literature, which stresses that food insecurity is multidimensional and only indirectly observable, making the choice and interpretation of indicators (including whether “higher is better” or “higher is worse”) a critical methodological decision (Barrett, 2010).

For chronic dietary-energy shortfalls, the primary global indicator is the Prevalence of Undernourishment (PoU), used to track progress towards SDG 2.1.1. PoU estimates the percentage of the population whose habitual food consumption provides insufficient dietary energy to maintain a normal, active, and healthy life. By construction, higher PoU values indicate deterioration (a larger share of people undernourished), while lower PoU values indicate improvement; analytically, PoU is best interpreted as a population-level measure of chronic inadequacy rather than an individual diagnostic (FAO, n.d.-a).

To capture lived constraints on access to food, the SDG 2.1.2 indicator relies on the Food Insecurity Experience Scale (FIES), which produces internationally comparable estimates of the prevalence of moderate or severe food insecurity (and separately, severe food insecurity) based on interview responses calibrated using psychometric methods. Here, higher prevalence values unambiguously indicate deterioration, as they signify a larger proportion of the population reporting experiences consistent with constrained access (moderate or severe). Closely related “experience-based” tools widely used in research and practice include the HFIAS and the Household Hunger Scale (HHS); in these

instruments, higher scores or categories indicate greater food insecurity (i.e., more severe or frequent constrained access and hunger). The same directional logic applies to the US Household Food Security Survey Module, where more affirmative responses (or higher severity placement) indicate a worse food security status (FAO, n.d.-b).

Food affordability is increasingly monitored through the Cost and Affordability of a Healthy Diet (CoAHD) metrics, as reported by FAO, IFAD, UNICEF, WFP, and WHO (2024). The cost of a healthy diet (CoHD) is defined as the cost of acquiring the least expensive healthy diet in a country; consequently, higher CoHD values indicate deterioration (healthy diets are more expensive). Complementary affordability measures are explicitly directional: the percentage of the population unable to afford a healthy diet and the number of people unable to afford a healthy diet both worsen as they increase, and affordability ratios (e.g., cost relative to a food poverty line or cost relative to food expenditures) likewise indicate worse affordability when higher (FAO, IFAD, UNICEF, WFP & WHO, 2024).

Where the analysis requires a single summary statistic, composite indices must be handled with particular care because their direction is not uniform across instruments. The Global Food Security Index (GFSI) reports an overall score (commonly on a 0–100 scale) in which higher scores indicate better food-security conditions, with “affordability” as a principal dimension; however, methodological reviews emphasise that such indices often rate the food-security environment/determinants rather than direct outcome prevalence (Economist Impact, 2022). By contrast, the Global Hunger Index (GHI) is explicitly scaled so that 0 represents the best outcome, and higher scores indicate worsening hunger; thus, increases in the GHI reflect deteriorating hunger conditions (Wiemers et al., 2024). For transparent reporting, it is therefore essential to state, for every indicator/index used, whether higher values represent improvement or deterioration, and to avoid mixing measures with different directions without re-scaling.

1.3 Cross-Country and Over-Time Comparability and Measurement Limitations

Cross-country and over-time comparability in food-security analysis is intrinsically constrained by the fact that “food security” is a multidimensional, partly latent condition, and different indicators capture different domains (energy adequacy, access constraints, diet quality, affordability, or vulnerability). Comparability is therefore not only a technical question of harmonised data collection, but also a conceptual question of whether the same underly-

ing phenomenon is being measured across settings and periods. The measurement literature repeatedly cautions that indicators can be weakly correlated and may respond differently to shocks, implying that international rankings or trend comparisons are safest when they triangulate several metrics rather than relying on a single headline figure (Barrett, 2010).

For the PoU, cross-country comparability is relatively strong when the same FAO methodology and inputs are applied, because it is computed using a standardised model that combines national food-availability data with assumptions about the distribution of habitual dietary energy consumption and minimum energy requirements. However, this standardisation comes with important limitations: PoU is a model-based, national-level estimate that cannot reveal who within a country is undernourished, is less informative about acute or short-term access disruptions, and does not capture diet quality or micronutrient adequacy. In addition, revisions to food-balance, population, and requirement parameters can create breaks in time series, so apparent changes over time may partly reflect updated data or methods rather than true shifts in deprivation (UNSTATS, 2025).

For experience-based metrics, the FIES was explicitly designed to enhance international comparability through psychometric calibration (Rasch modelling) and the use of a global reference scale, enabling prevalence estimates of moderate or severe food insecurity to be compared across countries. Nonetheless, translation nuances can still compromise comparability, including cultural differences in how questions are interpreted, survey mode and timing (such as seasonality), and response biases associated with stigma or social desirability. Validation studies generally find a good fit across many contexts but also document item misfit or erratic responses in some countries, which signals that cross-country comparability is not automatic and depends on careful implementation and ongoing statistical validation (Ballard et al., 2013).

For food affordability indices, such as the CoAHD metrics, comparability benefits from a consistent methodology that uses price data to compute the least-cost healthy diet and then derives affordability indicators (e.g., the share/number unable to afford it). However, these measures are particularly sensitive to the coverage and representativeness of national price data (urban bias, missing items, limited temporal granularity), the handling of inflation/PPP conversions, and the normative construction of what constitutes a “healthy diet” in different food environments. The estimates are also explicitly described as lower bounds because they typically abstract from preferences, convenience, the time costs of acquisition and preparation, and aspects of home production. These factors can vary systematically across countries and over time, thereby complicating the interpretation of trends (FAOSTAT, n.d.).

Composite indices can offer intuitive cross-country comparisons but often have weaker over-time comparability because their underlying data series, indicator sets, and weighting schemes are periodically revised. The GHI, for example, explicitly notes that methodological revisions (such as changes introduced from 2015 onward) can shift scores upward even without a true worsening in hunger, meaning that not all historical scores are directly comparable unless recalculated under a common method. More generally, composite indices may combine outcome and determinant variables and incorporate normative choices about weighting, so they are best treated as descriptive dashboards rather than definitive measures of food security. The measurement literature therefore recommends transparency about construction and caution when interpreting small rank changes across years (GHI, 2025).

1.4 Variable Dictionary Covering Names, Units, Frequency, Coverage, and Interpretation Rules of Food Security

To ensure transparency and replicability in the empirical assessment of food security, this monograph adopts a variable dictionary approach in which each indicator is documented with its name, unit, observation frequency, geographic/temporal coverage, and an explicit interpretation rule stating whether higher values denote improvement or deterioration. Such documentation is essential because widely used food-security metrics capture different dimensions (energy inadequacy, experienced access constraints, or affordability), and some are model-based or psychometrically calibrated rather than directly observed; without clear metadata, cross-variable comparisons and composite constructs become prone to misinterpretation (Cafiero et al., 2018).

Table 1.1 presents the concise dictionary used throughout the analysis. Two harmonised identifiers are applied across all datasets – ISO-3 code and calendar year – followed by the core outcome and affordability variables and, where relevant, composite indices used for contextual benchmarking. Directionality is stated explicitly in the final column to prevent mixing indicators with opposite meanings (e.g., “higher is worse” prevalence rates versus “higher is better” index scores) during modelling, normalisation, or visualisation (UNSTATS, 2024).

In substantive terms, the dictionary prioritises two globally standardised outcome indicators: PoU, which provides a harmonised estimate of chronic dietary-energy inadequacy and is conventionally published as a three-year average to reduce volatility from uncertain stock and availability components, and FIES-based prevalence, which offers internationally comparable esti-

TABLE 1.1 The concise dictionary. (Source: UNSTATS, 2024; FAO, n.d.-a; FAO, n.d.-b; World Bank, 2017–2022; FAO, IFAD, UNICEF, WFP, & WHO, 2024; GHI, 2025; Economist Impact, 2022).

Variable name	Indicator (source series)	Unit	Frequency/ reference window	Coverage (typical)	Interpretation rule
pou_pct	Prevalence of Undernourishment (SDG 2.1.1; FAO)	% of population	Reported as 3-year averages at the country level	Broad global coverage; long time series	Higher = deterioration
fies_modsev_pct	Prevalence of moderate or severe food insecurity (SDG 2.1.2; FIES)	% of individuals	Annual estimates; experience over the previous 12 months	extensive multi-country coverage since the mid-2010s	Higher = deterioration
fies_sev_pct	Prevalence of severe food insecurity (FIES)	% of individuals	Annual; previous 12 months	As above (where available)	Higher = deterioration
cohnd_intppp	Cost of a Healthy Diet (CoAHD)	Int\$ (PPP) per person per day	Annual (price-updated)	Multi-country global coverage	Higher = deterioration
uahd_pct	Unable to afford a healthy diet (CoAHD)	% of population	Annual	Multi-country global coverage	Higher = deterioration
uahd_n	Number unable to afford a healthy diet (CoAHD)	People (or a million people)	Annual	Multi-country global coverage	Higher = deterioration
ghi_score	Global Hunger Index (GHI)	0–100 score	Annual, with known method revisions	Subset of countries, varies by year	Higher = deterioration
gfsi_score	Global Food Security Index (GFSI; Economist Impact)	0–100 score	Annual	~110+ countries (varies by edition)	Higher = improvement

mates of experienced access constraints through Rasch-calibrated measurement on a common severity scale. These two series are treated as complementary rather than interchangeable: PoU is most informative for chronic undernourishment at the population level, whereas FIES captures lived access limitations that may respond more quickly to economic or social shocks, and both require explicit attention to their reference windows when interpreting annual changes (UNSTATS, 2024).

Affordability is operationalised using the CoAHD family of indicators, specifically the cost of the least-cost healthy diet (PPP dollars per person per day) and the prevalence/number unable to afford it. These measures are particu-

larly valuable for explaining why observed food insecurity may persist even when aggregate availability is adequate; however, they are also sensitive to the structure and coverage of underlying price data, as well as to methodological updates between International Comparison Program price benchmark years. Accordingly, the dictionary explicitly flags their units and direction, and the empirical workflow records the dataset version and update method used for each release (World Bank, 2017–2022).

Method implementation follows a reproducible pipeline. First, each series is downloaded from its custodian source (FAO SDG portal for PoU and FIES; FAOSTAT/World Bank CoAHD dissemination for affordability; and official GHI/GFSI releases for contextual index scores), and the extraction date plus dataset version is archived to prevent silent revisions from altering results (FAO, n.d.-a). Second, all files are harmonised to country_iso3-year, and built-in smoothing or reference windows are recorded (e.g., PoU as three-year averages; FIES referring to the previous 12 months) (UNSTATS, 2024). Third, interpretation rules are enforced programmatically: prevalence and cost/unaffordability variables remain “higher = worse”, while any “higher = better” index scores are either analysed separately or re-scaled only when a consistent direction is required for composite presentation (Economist, 2019). Fourth, missingness and methodology breaks are treated transparently through coverage tables and sensitivity checks (balanced vs unbalanced panels; exclusion of years affected by index-formula revisions), with composite indices used cautiously for benchmarking rather than as definitive outcome measures (GHI, 2025).

Conclusions

This section has demonstrated that food security is not a static or narrowly defined concept but an evolving analytical and policy framework shaped by changing socio-economic, institutional, and geopolitical conditions. The progression from early production-centred interpretations to access-based and multidimensional definitions reflects a growing recognition that food security depends not only on aggregate food availability but also on distributional mechanisms, purchasing power, nutritional adequacy, and the resilience of food systems over time. The consolidation of the four interdependent pillars – availability, access, utilisation, and stability – has provided a coherent structure for both empirical measurement and policy design, while also highlighting the systemic nature of food security challenges.

At the same time, the reviewed conceptual approaches underline that food security cannot be analysed in isolation from governance arrangements, institutional capacity, and external shocks. Contemporary frameworks increasingly emphasise sustainability, resilience, and policy coordination, acknowledging that food systems are embedded in broader economic, environmental, and political contexts. This perspective is particularly relevant under conditions of heightened uncertainty, where disruptions to trade, production, and incomes expose structural vulnerabilities that are not captured by static or purely supply-side indicators.

The conceptual foundations discussed in this section provide a necessary analytical basis for the subsequent empirical analysis. By clarifying the multi-dimensional nature of food security and its governance architecture, this part of the monograph establishes a consistent framework for interpreting indicators, assessing cross-country differences, and evaluating the impacts of shocks and policy responses. This integrated understanding is essential for developing evidence-based strategies to strengthen food security in both stable and crisis-affected economies.

Public Attention to Food Security under Armed Conflict

2.1 Methodology of the Investigation of Public Attention to Food Security during the Armed Conflict

The global food security situation remains fragile and highly vulnerable to geopolitical shocks, linking war and food insecurity, making it a pressing research priority. A FAO report indicates that hunger remains stubbornly high, with approximately 733 million people facing hunger in 2023, translating to 1 in 11 people worldwide. This is more pronounced in Africa, where it affects 1 in 5 people (FAO, IFAD, UNICEF, WFP, & WHO, 2024). A recent report estimated that 638–720 million (point estimate: ~673 million) faced hunger in 2024, with improvements unevenly distributed and deteriorations persisting in parts of Africa and Western Asia (FAO, IFAD, UNICEF, WFP, & WHO, 2025). These figures indicate that food insecurity has not returned to pre-pandemic levels and that global progress towards SDG 2 remains off track, particularly amid high food inflation and recurring shocks.

Russia's full-scale invasion of Ukraine intensified these vulnerabilities by disrupting major grain, fertiliser, and energy supply channels, thereby amplifying price volatility and import risks for food-deficient economies. The FAO Food Price Index reached its peak in March 2022. While it later eased, it remained materially above pre-war baselines, reflecting the war's significant impact on global food markets (FAO, 2026). UN system briefs similarly emphasise that the war has propagated through food, energy, and finance systems, reinforcing the view that food security is increasingly shaped by intertwined geopolitical and macroeconomic channels rather than agricultural factors alone (UNSDG, 2022). Complementing this, the World Bank's Food Security Updates document persistent price pressures and volatility in staple markets compared to January 2020 levels, underscoring the long tail of shock transmission into affordability conditions (IBRD-IDA, 2024).

Against this background, analysing public attention and information demand becomes policy-relevant in its own right. Google Trends offers a timely behavioural signal of how societies perceive and prioritise food risks during conflict-driven disruptions, including whether attention concentrates on outcomes ("food security") or on mechanisms (grain exports, sanctions).

Such evidence can support risk communication, early-warning dashboards, and targeting of social protection by revealing when food insecurity becomes salient, where attention is concentrated, and how quickly war-related shocks translate into broader welfare concerns at the societal level.

The aim of this study is to examine the extent to which the Russian–Ukrainian war has intensified global food-security concerns and altered public awareness of trade – and policy-related transmission channels, using Google Trends as a real-time indicator of societal risk perception.

This study utilises Google Trends data to investigate global public attention to food security and its interconnections with the Russian–Ukrainian war, grain exports, and sanctions from January 1, 2010, to December 31, 2025. Google Trends provides a normalised index of search interest ranging from 0 to 100, where values represent the relative popularity of a search term within a specified time frame, region, and query set. The analysis focuses on four core keywords (food security, Russian–Ukrainian war, grain export, and sanctions) selected to capture outcome-oriented concerns (food security), triggering geopolitical events (war), and key transmission mechanisms (trade and sanctions). The approach treats search intensity as a proxy for public attention and perceived salience rather than as a direct measure of objective conditions.

The empirical strategy combines time-series, cross-country, and spatial analyses. First, worldwide monthly time-series indices were extracted to identify structural breaks and long-run shifts in attention before and after February 2022, the onset of the Russian–Ukrainian war. Average index values were calculated for the pre-war and post-war sub-periods to assess changes in global attention patterns. Second, country-level distributions were constructed by calculating the proportional share of each keyword in total search interest per country over the full period, allowing for a comparative assessment of how different societies prioritise food security, war-related information, and policy mechanisms. Countries with insufficient search volume were retained as missing observations, consistent with Google Trends’s methodological constraints.

Third, geographical visualisation was applied using Google Trends’ “Interest by region” outputs to map spatial heterogeneity in search behaviour. Choropleth maps were analysed descriptively to identify clusters of low and close attention and to compare patterns across food security, war, grain exports, and sanctions. Summary statistics (including medians, interquartile ranges, and maxima) were used to characterise the skewness and concentration of search interest across regions. This spatial perspective enables differentiation between structurally vulnerable regions, geopolitically exposed economies, and countries where attention remains comparatively muted.

In addition, the study analyses “Related queries” (Top and Rising) to capture the semantic structure and dynamics of public information demand. “Top” queries were used to identify dominant narratives and entry points (e.g., welfare access, news monitoring, or conceptual clarification), while “Rising” queries, especially those labelled as “Breakout”, were interpreted as indicators of rapidly expanding attention linked to events, policy announcements, or educational cycles. This component provides qualitative depth by revealing whether searches are driven by administrative needs, crisis monitoring, learning processes, or policy interpretation.

The methodology employs a descriptive–analytical design, triangulating temporal trends, country-level compositions, spatial distributions, and query semantics to construct a comprehensive picture of global public attention. While Google Trends data are relative and do not measure absolute levels of concern, their systematic use across multiple dimensions allows for robust inference about shifts in salience, regional asymmetries, and the gap between public concern for outcomes (food security) and attention to underlying mechanisms (grain exports and sanctions). The full data extraction and intermediate results are documented in the accompanying materials.

2.2 Analysis of Time Trends of Public Interest to Food Security during the Armed Conflict

Figure 2.1 demonstrates a pronounced structural shift in global search behaviour associated with the outbreak of the Russian–Ukrainian war in February 2022. Based on the Google Trends data, average worldwide interest in food security increased from 10.9 points in the pre-war period (2010–January 2022) to 16.7 points in the post-war period (February 2022–2025), indicating a sustained rise of more than 50%. Before 2022, attention to food security fluctuated within a relatively narrow corridor, reflecting episodic concerns linked to commodity price volatility or regional shocks rather than persistent global anxiety.

The war itself triggered an unprecedented and immediate surge in public attention. Searches for the Russian–Ukrainian war jumped from a negligible pre-war average of 0.4 points to a post-war mean of 20.6 points, peaking at the maximum Google Trends value of 100 in early 2022. This sharp spike reflects the sudden globalisation of the conflict in public discourse. Importantly, the timing of this peak coincides with the initial escalation of hostilities and the disruption of Black Sea supply routes, suggesting that the transmission of geopolitical shock into public awareness was both rapid and intense.