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Review Article

GLOBAL OVERPOPULATION AS A POTENTIAL FACTOR OF WORLD HUNGER: LINKS, CONSTRAINTS AND POLICIES

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Abstract: *The issue of world hunger remains a critical challenge within international development economics, with its structural causes generating significant academic debate. While classical paradigms often isolate agricultural supply failures as the primary driver, this paper analyzes the structural link between global overpopulation, ecological constraints, and food insecurity through a critical synthesis of macroeconomic theories and contemporary demographic data. The primary objective of the study is to evaluate the relative impact of population growth against socio-economic and institutional factors in determining global hunger. The paper operationalizes the research hypothesis (H1) that global overpopulation acts as an exogenous catalyst that amplifies environmental constraints, but the actual manifestation of hunger is strictly mediated by regional institutional capabilities and economic entitlements. Potential policy interventions are systematically categorized into techno-agricultural innovations and institutional reforms differentiated by regional economic contexts..*

Key words*: overpopulation, food supply, hunger, food security, natural resources, environment.*

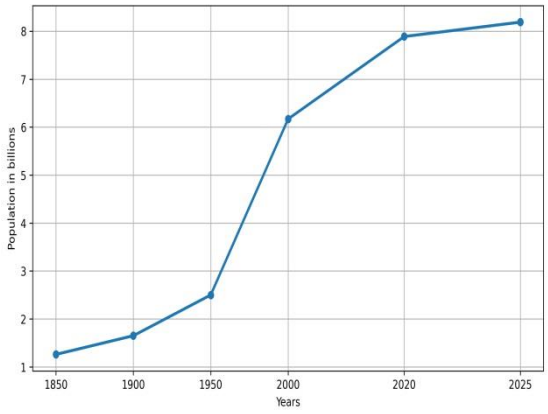
JEL classification: QO1

1. INTRODUCTION

The intersection of demographic expansion, resource depletion, and global food security constitutes one of the core challenges of sustainable development. Traditional Malthusian frameworks posit a direct causal link between population growth and systemic food shortages due to the diminishing returns of agricultural land. However, contemporary empirical trends complicate this linear relationship. Despite consistent global increases in aggregate agricultural production, the absolute number of individuals experiencing chronic undernourishment remains high, suggesting that structural food insecurity cannot be evaluated solely through the lens of supply-side metrics.Consequently, this paper investigates the multidimensional nature of global hunger by addressing the following central research question: To what extent does global overpopulation independently drive world hunger, and how do institutional and socio-economic variables mitigate or exacerbate this dynamic? To guide the analysis, the study formulates a central research hypothesis (H_1): While global population growth functions as a fundamental destabilizing factor that intensifies structural pressures on finite natural resources, the regional distribution and intensity of hunger are ultimately determined by institutional distribution mechanisms and economic entitlements. From a demographic standpoint, the trajectory of global population expansion imposes rigid quantitative demands on global output. The global population crossed the 8 billion threshold in late 2022 and continues an upward trajectory (UN DESA, 2024). Projections indicate an estimated global population of 9.7 billion by 2050 (World Bank, 2019). This momentum is structurally driven by the current demographic momentum; approximately 1.2 billion individuals globally are adolescents transitioning into reproductive cohorts. Even under conservative fertility variants (e.g., a decline to replacement-level fertility of 2.1 births per woman), momentum guarantees an expansion of total food demand over the coming decades. According to the Food and Agriculture Organization, approximately 8.2% of the global population (roughly 680 million people) suffered from chronic undernourishment in 2024 (FAO et al., 2025). The charts and table below illustrate the dynamics of world population growth, as well as

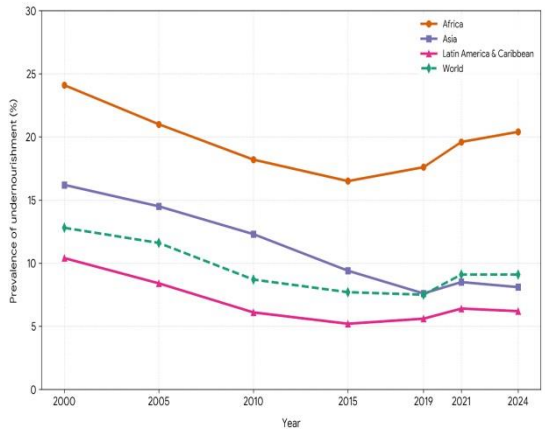
data on the prevalence of undernourishment by region.

Chart 1. Global Population Growth (1850 – 2025)



Source: Author's illustraton based on data from UN DESA, 2024.

Chart 2. Prevalence of undernourishment by regions (2000 – 2024)



Source: Author's illustration based on data from FAO, 2025.

Table 1. Percentage of undernourished population by regions (2000 – 2024)

Year	AF (%)	AS (%)	LA (%)	WD (%)
2000	24.1	16.2	10.4	12.8
2005	21	14.5	8.4	11.6
2010	18.2	12.3	6.1	8.7
2015	16.5	9.4	5.2	7.7
2019	17.6	7.6	5.6	7.5
2021	19.6	8.5	6.4	9.1
2024	20.4	8.1	6.2	9.1

Source: Author's illustration based on data from FAO, 2025.

To resolve the analytical ambiguity between population pressure and socio-economic distribution, this paper is structured as follows. Section 2 reviews the foundational literature regarding environmental and demographic constraints. Section 3 outlines the competing theoretical frameworks of Malthusian, Boserupian, and entitlement theories. Section 4 contains the Methodology. Section 5 details the research results with specific regional focuses. Section 6 provides a structural discussion of these findings, and last section presents contextualized policy recommendations and conclusions.

2. LITERATURE REVIEW

The optimization of food security and poverty alleviation is prioritized under the United Nations Sustainable Development Goals (SDGs), specifically SDG 1 (No Poverty) and SDG 2 (Zero Hunger). Obaisi (2017) systematically evaluates the macro-environmental impacts of population growth on agricultural sustainability in developing countries, categorizing the operational challenges into four primary dimensions: global demographic projections, qualitative natural resource degradation, migration vectors, and accelerated urbanization. The study concludes that unmitigated population growth poses a structural threat to resource preservation, though it presents agricultural technology as an endogenous mechanism to offset supply shortfalls without fully addressing the underlying demographic momentum.

The ecological feedback loops of population expansion are further cross-examined by Robertson and Jargin (2025), who argue that environmental degradation is functionally correlated with population density in Less Developed Countries (LDCs). This correlation is exacerbated by relaxed regulatory frameworks and institutional volatility characteristic of emerging economies. Under current consumption and demographic trajectories, aggregate human resource extraction is projected to exceed baseline bio-capacity thresholds by over 200% by 2050, rendering current patterns ecologically unsustainable (Greguš & Guillebaud, 2020).

Furthermore, regional imbalances between resource availability and demographic concentration require distinct theoretical categorizations. Regional overpopulation occurs when a localized population exceeds the carrying capacity of its immediate biophysical environment (Barrett, 2013). While some literature proposes aggressive demographic interventions—such as localized fertility restrictions in resource-stressed zones alongside expansionary policies in resource-surplus regions (Robertson & Jargin, 2025)—the

historical implementation of such measures reveals severe institutional distortions.

For instance, the historical trajectory of family planning policies in India introduced standardized contraceptive distribution and state-incentivized sterilization protocols (Danda, 1984). Similarly, China's stringent enforcement of the one-child policy successfully suppressed fertility rates to sub-replacement levels (1.5–1.7) by the late 1990s, before transitioning to a two-child framework post-2015 and subsequent expansionary pronatalist measures in response to rapid demographic aging (Li et al., 2024). Conversely, certain institutional contexts utilize demographic expansion as an instrument of geopolitical leverage, frequently resulting in regressive policies that compromise individual reproductive autonomy (Jargin, 2022; Tarzia & McKenzie, 2024). Consequently, the literature demonstrates that demographic policies cannot be decoupled from the broader socio-political and institutional framework of the state.

3. THEORETICAL FRAMEWORK

To establish an analytical framework for evaluating the causal links between overpopulation and hunger, three distinct theoretical paradigms must be integrated: Malthusianism, Boserupian innovation theory, and Sen's Entitlement Approach.The baseline classical paradigm originates from Thomas Robert Malthus (1798), who conceptualized population growth as an exponential function and food production as an arithmetic function. (Malthus posited that unchecked population growth inevitably triggers structural food deficits, resulting in positive checks (famine, disease, conflict) to restore demographic equilibrium. Malthus utilized this framework to critique William Godwin's (1793) utopian socialist theory, which identified institutional arrangements and systemic inequality as the sole drivers of poverty and hunger. Malthus argued that even in a completely egalitarian society devoid of institutional oppression, the mathematical asymmetry between reproductive capacity and agricultural yields would inevitably re-establish poverty and resource competition.Contemporary Neo-Malthusian theory (Ehrlich & Ehrlich, 2009) expands this dynamic past agricultural yields to encompass wider ecological carrying capacities, including freshwater depletion, soil erosion, and macro-climatic disruptions.

This pessimistic model was challenged by Ester Boserup (1965), who inverted the Malthusian causal chain. Boserup argued that population concentration serves as a necessary prerequisite and catalyst for agricultural intensification and technological innovation. Under the Boserupian framework, demographic pressure induces institutional and technological adaptations—such as transitioning from extensive shifting cultivation to intensive multi-cropping systems, utilizing advanced irrigation, and developing high-yield crop variants (Turner & Fischer-Kowalski, 2010).

A third alternative paradigm is advanced by Amartya Sen (1983) through the Entitlement Approach. Sen shifts the analytical focus away from aggregate food availability decline (FAD) to individual food entitlement decline (FED). Sen demonstrates empirically that catastrophic famines and chronic hunger frequently occur during periods of stable or rising food production. Under this framework, hunger is primarily a function of distribution failures, market distortions, and socio-economic inequalities. An individual's food entitlement is determined by their endowment (ownership of labor, land, and capital) and exchange entitlement mappings (the capacity to purchase food via market mechanisms or secure it through state-backed institutional safety nets).

Critiques of Sen's framework, notably by Bowbrick (2022), caution against the complete de-emphasis of aggregate production metrics, arguing that ignoring physical supply vectors can inadvertently reduce capital investments in agricultural R&D, thereby triggering structural supply shocks that exacerbate market-driven distribution failures.

4. METHODOLOGY

To investigate the multi-faceted relationship between global overpopulation and world hunger, this study adopts a qualitative, secondary research design rooted in literature synthesis and comparative data analysis. Rather than generating primary empirical data, the methodology focuses on evaluating, comparing, and integrating existing macro-economic theories, demographic projections, and global food security indices. This approach is highly suitable for addressing complex macro-economic and sustainable development issues that span multiple decades and geographic regions.

The research process was structured into three consecutive phases:

4.1 LITERATURE SELECTION AND THEORETICAL MAPPING

The foundational phase involved an extensive narrative review of both classical and contemporary economic and sociological literature. To construct a balanced dialectical framework, works representing contrasting academic perspectives were systematically mapped:

- The Neo-Malthusian Perspective: Documenting the direct negative strains of population growth on natural resources (e.g., Malthus, 1798; Ehrlich & Ehrlich, 2009; Obaisi, 2017; Robertson & Jargin, 2025).
- The Boserupian and Entitlement Perspectives: Documenting the counter-arguments that emphasize technological adaptation, institutional roles, and socio-economic access over physical scarcity (e.g., Boserup, 1965; Sen, 1983).

4.2. SECONDARY DATA COLLECTION AND HARMONIZATION

To substantiate the theoretical frameworks with real-world evidence, secondary quantitative data were gathered from verified, high-authority international databases. The core data sources include:

- Demographic Metrics: Historic population tracks and future projections up to the year 2050 extracted from the United Nations Department of Economic and Social Affairs (UN DESA, 2024) and the World Bank Open Data platform (2019, 2024).
- Food Security and Poverty Metrics: Global undernourishment rates, regional poverty headcounts, and food availability indices obtained from the collaborative State of Food Security and Nutrition in the World (SOFI 2025) report by the FAO, IFAD, UNICEF, WFP, and WHO.

4.3. COMPARATIVE AND SYNTHESIZING ANALYSIS

The final phase utilized qualitative content analysis alongside descriptive statistics comparison. Data regarding population growth trends were cross-examined with corresponding regional food insecurity metrics, focusing heavily on highly vulnerable geographic clusters such as Sub-Saharan Africa.

By evaluating where regional resource capacities fail to match population demands (e.g., examining case studies like Uganda, Nigeria, and Ethiopia alongside demographic policies in India and China), the analysis distinguishes between absolute food scarcity caused by population pressure and relative food insecurity driven by institutional, political, and socio-economic failures.

5. RESEARCH RESULTS

A synthesis of the secondary quantitative data demonstrates a profound divergence between aggregate global food production capacities and regional food security metrics.

According to macro-level projections compiled by Obaisi (2017), while global agricultural output possesses the technical capacity to expand, it faces severe regional constraints due to accelerating environmental degradation. The unmitigated expansion of agricultural land required to feed a projected population of nearly 10 billion by mid-century induces severe structural strains on water tables, topsoil depth, and regional biodiversity matrices.

The operational reality of these ecological constraints is evident in targeted regional evaluations, particularly across Sub-Saharan Africa. Data from the World Bank (2024) indicates that Sub-Saharan Africa exhibits the highest concentration of extreme poverty globally, with approximately 67% of the regional population living below the poverty threshold, while simultaneously experiencing the fastest demographic growth rate.

Under current projections, countries such as Uganda are expected to experience a three-fold population increase by 2050, potentially exceeding 100 million inhabitants (Coombes, 2009).

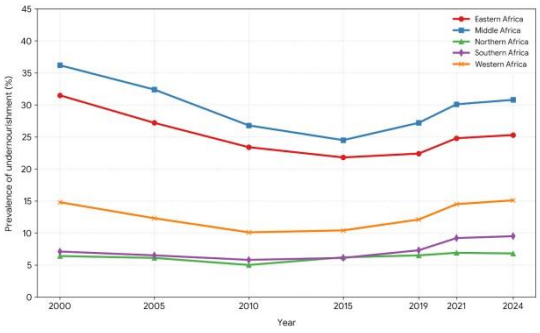
The empirical consequence of this growth is localized ecological degradation, driven by deforestation and unsustainable agricultural expansion into marginal lands to satisfy immediate caloric demands. Similar structural patterns of soil degradation and desertification are documented in Nigeria and Ethiopia (Nyssen et al., 2009).

This regional resource stress correlates directly with severe undernourishment metrics. In the sub-Saharan region, chronic undernourishment affected approximately 24.1% of the total population (roughly 264.2 million individuals) during peak stress periods (Owolade et al., 2022).

These findings validate the Neo-Malthusian hypothesis regarding regional resource constraints: in geographically vulnerable and economically fragile areas, demographic expansion directly correlates with the degradation of natural inputs (soil and water), which undercuts the local agricultural base.

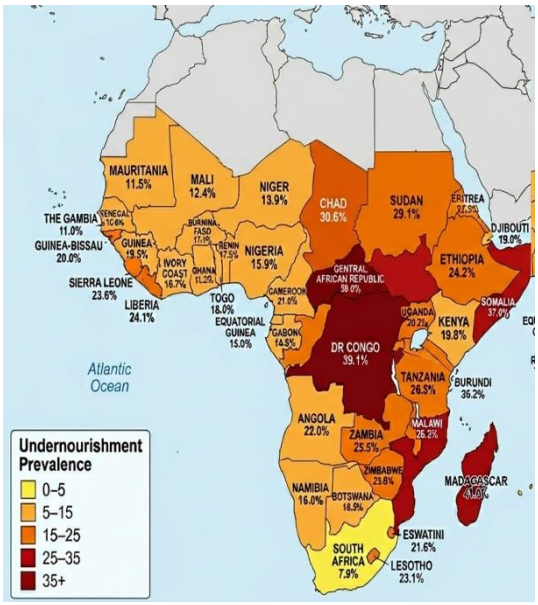
The chart and picture below illustrate the prevalence of undernourishment across African regions, with a specific focus on the Sub-Saharan region.

Chart 3. Prevalence of undernourishment in Africa's regions (2000 – 2024)



Source: Author's illustration based on data from FAO, 2025.

Picture 1. Prevalence of undernourishemnt in Sub-Saharan region (2024)



Source: Author's illustration based on data from FAO, 2025.

Conversely, the data demonstrates that demographic expansion does not uniformly produce food insecurity when mediated by robust institutional frameworks and technological adaptation. In regions characterized by high capital accumulation and functional market distribution channels, population density has historically aligned with the Boserupian model, inducing infrastructural investments and the adoption of advanced agricultural techniques.

Furthermore, historical data regarding direct state-led demographic interventions reveals mixed outcomes. China's institutional imposition of the one-child policy significantly altered its demographic trajectory, reducing immediate consumer demand pressures, yet generating long-term structural distortions including labor shortages and rapid demographic aging that required immediate policy reversals (Li et al., 2024). These empirical observations confirm that demographic variables cannot be isolated as an independent cause of hunger; rather, their impact is heavily dependent on regional economic endowments, state-level institutional execution, and market access mechanisms.

6. DISCUSSION

The synthesis of theoretical frameworks and empirical data reveals that the relationship between global overpopulation and world hunger is non-linear and institutionally contingent. The descriptive assumption that population growth acts as the exclusive or direct cause of hunger is analytically flawed. Instead, the empirical evidence supports the research hypothesis (H_1): overpopulation functions as an exogenous catalyst that compounds systemic stress on finite environmental resources, but the transformation of this resource stress into chronic hunger is determined by socio-economic structures and entitlement distribution.

When cross-examining the literature, Obaisi (2017) reflects a Malthusian framework by identifying natural resource degradation as an inevitable consequence of population growth. However, Obaisi's reliance on technological innovation as a mitigating factor represents a structural convergence with Boserupian (1965) theory. This synthesis implies that while resource constraints are real, they are mutable through capital-intensive agricultural development.

Robertson and Jargin (2025) provide empirical support for Neo-Malthusian carrying-capacity limits by documenting environmental degradation in vulnerable LDCs. Crucially, however, their findings also incorporate Godwinian and Senian elements by identifying institutional failure as a major variable. When they analyze sub-Saharan countries like Uganda and Nigeria, the manifestation of chronic hunger is not merely a product of absolute local food deficits, but a reflection of low purchasing power, market fragmentation, and insufficient state-backed safety nets—precisely as posited by Sen's Entitlement Approach (1983).

By structuring the argument hierarchically, it becomes clear that absolute food availability (the Malthusian/Boserupian focus) and relative food accessibility (Sen's focus) are not mutually exclusive but function on different structural levels. Within this unified analytical model, global overpopulation operates as the primary catalyst, generating long-term macroeconomic pressure on aggregate food demand and inflicting severe strain on finite environmental inputs like water and

topsoil depth, as theorized by Malthus and Ehrlich. However, the mechanism that directly mediates this resource strain and determines whether it manifests as chronic hunger is the regional socio-economic and institutional context, which dictates individual entitlement mappings, income distribution, and market access in line with Sen's framework. Finally, technological innovation acts as an adaptive buffer, aligned with Boserupian theory, which can temporarily expand regional carrying capacities through R&D, advanced inputs, and agricultural intensification. Therefore, population growth establishes the structural baseline for global demand and environmental stress, but institutional and economic distribution networks ultimately determine exactly who experiences caloric deficits.

CONCLUSION

This study demonstrates that global overpopulation exerts a persistent, compounding strain on the global food matrix by accelerating natural resource degradation and expanding aggregate caloric demand. However, overpopulation cannot be classified as the sole or independent driver of global hunger. The structural manifestation of hunger is an institutional and economic phenomenon, driven by distribution failures, poverty traps, and unequal entitlement mappings.

To achieve sustainable food security, policymakers must shift away from generalized, universally applied global strategies and instead develop highly differentiated interventions tailored to specific institutional and economic contexts:

Policy Framework for Less Developed Countries (LDCs) with High Population Stresses

In regions characterized by severe capital constraints, high demographic momentum, and extensive resource degradation (e.g., Sub-Saharan Africa):

- Institutional Entitlement Reforms: Prioritize the development of localized social safety nets, agricultural subsidies for smallholder farmers, and land-tenure reforms to protect smallholder endowments and stabilize exchange entitlements.
- Socio-Demographic Empowerment: Rather than coercive demographic restrictions, implement structural investments in female secondary education and universal healthcare access, including comprehensive family planning. Empirical data consistently indicates that female educational attainment is the most effective institutional driver for voluntary fertility stabilization.
- Low-Cost Ecological Adaptations: Invest in community-level water harvesting infrastructure, agroforestry practices to combat topsoil erosion, and micro-irrigation systems that preserve fragile regional ecosystems.

Policy Framework for Transitional and Developing Economies

In regions featuring rapid urbanization and evolving market structures (e.g., South/East Asian contexts):

- Boserupian Infrastructure Intensification: Direct state and private capital toward advanced agricultural R&D, focusing on drought-resistant, high-yield crop variants and mechanized, high-efficiency harvesting systems to minimize post-harvest waste.
- Market Integration and Supply Chain Resiliency: Construct integrated regional food storage and transportation infrastructure to eliminate market-driven localized price shocks and ensure stable food distribution channels during macro-environmental disruptions.
- Ultimately, the global mitigation of hunger remains a achievable objective, provided that international policy paradigms integrate technological supply expansion with aggressive institutional reforms aimed at eliminating socio-economic inequality.

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