Narrative Review Article

Evaluating U.S., EU, and UN Food Aid in Yemen and South Sudan (2020–2024) Against Sphere Standards

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ABSTRACT

Humanitarian food assistance faces renewed scrutiny as acute hunger reaches its highest global level in decades. This study evaluates how emergency aid financed by the United States and the European Union, and coordinated by the United Nations, in Yemen and South Sudan (2020–2024) aligned with Sphere Handbook standards for daily calories (2,100 kcal), protein share (10–12%), and micronutrient adequacy. Drawing on Integrated Food Security Phase Classification data, agency monitoring records, financial trackers, and peer-reviewed efficiency studies, the research applies a quantitative and qualitative comparative design to quantify delivery shortfalls and diagnose systemic constraints. Findings show that large-scale operations averted famine for more than 20 million people, yet provided only 1,050–1,500 kcal on average; protein goals were inconsistently met, while micronutrient diversity remained scarce, sustaining crisis-level malnutrition. Six interlocking barriers explain these gaps: persistent funding deficits, limited efficiency gains from cash and local procurement, uneven accountability and targeting, politicized access restrictions, the under-prioritization of nutrient-dense commodities, and the limited scale of forecast-based anticipatory financing. The paper concludes that multi-year flexible funding, mandatory nutrition metrics, unified access diplomacy, scaled biometric oversight, and mainstream anticipatory action could markedly raise the marginal social benefit of each humanitarian dollar and shift food aid from triage toward standards-based nutrition security.

Keywords: Humanitarian food assistance; Yemen; South Sudan; Acute food insecurity (IPC); Cash-based assistance (CVA)

INTRODUCTION

Acute food insecurity has escalated sharply over the past decade. The 2024 Global Report on Food Crises estimates that in 2023, nearly 282 million people in 59 countries faced crisis-level or worse hunger (IPC Phase 3+), the highest figure on record (1). This surge has been driven largely by income and supply disruptions related to the COVID-19 pandemic and by the war in Ukraine, which disrupted grain and fertilizer exports and pushed global food prices to multi-decade highs (2, 3). These pressures have strained the humanitarian system as donors confront rising caseloads in an environment of fiscal and geopolitical constraints.

Within this global landscape, Yemen and South Sudan stand out as two of the most severe and protracted emergencies in 2020–2024. IPC analyses indicate that, for much of this period, more than half of each country's population required emergency food assistance to avoid a further deterioration into famine-like conditions (4,

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5). These crises are rooted in prolonged civil conflict, economic collapse, and climate shocks, and both have attracted substantial external assistance: billions of dollars in food and nutrition programs financed mainly by the United States and the European Union and implemented primarily by United Nations agencies, especially the World Food Program (WFP) and UNICEF (1, 4–7). The scale of these operations makes the two countries a revealing test of what contemporary emergency food aid can realistically achieve.

Humanitarian agencies formally benchmark emergency food and nutrition assistance against the Sphere Handbook, which sets widely used minimum standards for survival in crisis settings; for general rations, it recommends about 2,100 kilocalories per person per day, with 10–12% of energy from protein, around 17% from fat, and sufficient micronutrient intake ensured through diet diversity or fortification (8).

This study adopts a mixed quantitative–qualitative comparative design. For each country, it reconstructs a 2020–2024 timeline of needs, transfers, and nutrition outcomes using IPC datasets, OCHA humanitarian needs overviews, WFP food-security updates, and UNICEF supply and program reports (4–6, 9–11). These data are combined with donor financing information from WFP contribution statistics and with operational detail drawn from WFP Executive Board documents on cash-based assistance, UNICEF market and supply updates for ready-to-use therapeutic foods (RUTF), and peer-reviewed evaluations of cash and local-procurement modalities (7, 11–14). Triangulation proceeds in two steps: where indicators such as beneficiary numbers or ration levels are reported by multiple sources, the analysis cross-checks values and adopts the most conservative (lower coverage or calorie) estimate; for frequently cited figures such as the 1,050-kilocalorie transfer, it recalculates values by applying Sphere's 2,100-kilocalorie reference to the ration fractions reported by WFP and media outlets (for example, a 50% ration ≈ 1,050 kilocalories) (8, 15). No new household surveys are undertaken; instead, existing datasets and evaluations are synthesized to approximate the share of emergency transfers that met or fell short of Sphere's minimum standards (4–6, 9–11).

The paper proceeds as follows. Section II summarizes the humanitarian trajectories of Yemen and South Sudan between 2020 and 2024, focusing on how conflict, climatic shocks, and economic collapse translated into acute hunger and shaped operational constraints on aid delivery. Section III compares the quantity and nutritional quality of assistance provided by the United States, the United Nations system, and the European Union with Sphere benchmarks. Section IV synthesizes cross-cutting constraints—chronic underfunding, limited efficiency gains, accountability and targeting challenges, politicized access, nutritional quality, and the partial promise of anticipatory action—and discusses their policy implications. Section V concludes. This paper evaluates whether emergency food assistance in Yemen and South Sudan between 2020 and 2024 met Sphere Handbook nutrition standards and identifies the systemic barriers that prevented adequate delivery.

HUMANITARIAN CRISIS CONTEXT IN YEMEN AND SOUTH SUDAN (2020–2024)

Yemen's conflict, now in its second decade, has repeatedly pushed large parts of the population to the edge of famine. A United Nations–mediated truce in 2022 reduced frontline fighting and eased some constraints around the Red Sea port of Hodeidah, but the pause proved fragile (16). In April 2024, Houthi forces looted a WFP warehouse in Saʿada, prompting the suspension of food shipments into much of the north and abruptly cutting off rations for an estimated three million people (17). Even before this rupture, IPC analyses estimated that 17.4 million Yemenis were acutely food-insecure (IPC 3+) in early 2022, including about 31,000 people in "Catastrophe" (IPC 5) conditions despite ongoing aid (4). Across 2023–2024, roughly half of the population remained in crisis or worse, with humanitarian assistance the main factor preventing an even sharper deterioration (1, 4, 6).

Malnutrition indicators underline the severity and persistence of this emergency. IPC reporting suggested that around 2.2 million children under five were acutely malnourished in 2022, with pockets of Global Acute Malnutrition (GAM) well above the 15% emergency threshold in several governorates (4). Yemen's economic collapse further eroded household purchasing power: between 2020 and 2024, the rial depreciated sharply, and the cost of a minimum food basket more than doubled, driven by global price spikes, conflict-related market fragmentation, and domestic fuel shortages (1, 18). In this environment, dependence on external aid rose steadily. OCHA's 2024 Humanitarian Needs Overview estimated that around 18 million people required some form of food assistance, while WFP and partners were able to reach between 13 million and, after funding cuts, fewer than 9 million people per month (6, 10, 19).

Funding shortfalls translated directly into caloric

deficits. In mid-2022, WFP announced that, owing to a lack of resources and high import costs, it would reduce general food assistance for roughly eight million Yemenis to "half rations," halving the energy content of the standard basket (15). Under Sphere's 2,100-kilocalorie standard, a 50-percent ration corresponds to only about 1,050 kilocalories per person per day for those households (8, 15), while others saw smaller cuts or were moved to less frequent distributions. At the point of the 2022 cuts, only about five of the then thirteen million recipients—roughly 38% of the caseload—continued to receive an allocation designed to meet Sphere's energy standard, and subsequent pipeline breaks reduced this share still further (10, 15). WFP's post-distribution monitoring for October 2024 found that 48% of assisted households nevertheless recorded poor or borderline food-consumption scores, confirming that the combination of reduced rations and high prices left many recipients below minimum dietary requirements even when aid was delivered (10).

South Sudan's trajectory over 2020–2024 presents a different configuration of drivers but a similar pattern of chronic crisis. Following a 2018 peace agreement, large-scale national conflict subsided, yet localized violence, armed cattle raiding, and banditry remained widespread (9,20). At the same time, the country experienced four consecutive years of severe flooding, beginning in 2019. World Bank analysis suggests that floodwaters submerged around 8% of arable land at its peak, destroyed harvests, and displaced hundreds of thousands of people, especially in Jonglei, Unity, and Upper Nile states (21). These shocks repeatedly undermined subsistence agriculture and livestock herds, leaving many households reliant on seasonal humanitarian airdrops or river-barge deliveries (9, 22).

The scale of acute food insecurity was comparable to that of Yemen in relative terms. During the 2023 lean season, approximately 6.3 million South Sudanese—about 52% of the population—were classified in IPC Phase 3 or higher, and analysts projected that without sustained assistance, tens of thousands could fall into Catastrophe (IPC 5) by mid-2024 (5). National surveys recorded some of the world's highest malnutrition levels: in several counties, GAM in children under five exceeded 20%, signaling an emergency level of wasting (1, 5, 9). Humanitarian access was repeatedly disrupted by insecurity, bureaucratic impediments, and opportunistic rent-seeking by local authorities. OCHA recorded dozens of discrete access incidents in a single month in early 2024, including violent attacks on convoys, looting of supplies, and administrative blockages (23). To sustain operations, WFP relied on a complex logistics network that combined road transport, river barges, and expensive airdrops into flooded or conflict-affected areas (9, 22).

As in Yemen, international assistance in South Sudan was substantial yet chronically under-resourced. The South Sudan Humanitarian Fund and broader response plans remained persistently underfunded across the period, forcing agencies to scale back general food distributions and prioritize only the most food-insecure counties (1, 9, 24). In 2022, WFP suspended assistance for around 1.7 million people because no further resources were available, and many remaining beneficiaries were shifted to reduced rations that delivered roughly half of Sphere's recommended energy intake (9). The result was a chronic "survival mode" in which large-scale famine was averted, but crisis-level hunger and acute malnutrition persisted for a large share of the population year after year.

Together, these country profiles highlight the structural dilemma that frames the performance assessment that follows. Even at peak scale, donor-financed programs in Yemen and South Sudan faced needs that exceeded available resources, and they operated in contexts where conflict, economic fragmentation, and climate shocks continually undermined household resilience. The extent to which USAID, the UN system, and the EU managed, within these constraints, to meet Sphere standards on calories, protein, and micronutrients is examined in the next section.

PERFORMANCE OF KEY FOOD-AID PROVIDERS IN YEMEN AND SOUTH SUDAN

This section assesses the contributions of the three principal actors shaping emergency food assistance in Yemen and South Sudan during 2020–2024. It treats the United States and the European Union primarily as financiers and policy-shapers, and the UN system, primarily WFP and UNICEF, as the main operational implementers. Because most transfers are delivered through pooled pipelines, the analysis does not attempt to attribute specific outcomes to a single donor. Instead, it examines how the combined financing from USAID and the EU, through UN operations, translated into caloric and nutritional outcomes relative to Sphere standards.

United States: scale, modality choices, and caloric outcomes

Across the five-year period, the United States remained the largest bilateral contributor to food-

security operations in both crises. According to WFP's contribution statistics, USAID and other U.S. channels consistently ranked as the top funder of WFP's Yemen and South Sudan programs, often providing between one-third and one-half of annual recorded contributions for general food assistance and nutrition activities (7). OCHA's Yemen Humanitarian Needs Overview and related financing data indicate that cumulative U.S. humanitarian allocations to Yemen between 2020 and 2024 totaled several billion dollars, with the majority directed to food security and livelihoods (6). In South Sudan, U.S. emergency funding also reached into the billions of dollars and underwrote a large share of WFP's rural airdrops and river-barge operations (9, 22).

In terms of calories, this financing enabled the United States, through its UN and NGO partners, to help sustain one of the largest food-assistance operations in modern history. During the peak years of Yemen's emergency response, American and other donor resources enabled WFP to reach up to 13 million people per month with general food assistance (6, 10, 19). In South Sudan, U.S.-supported operations provided food or cash to between five and seven million people annually, often in extremely remote or flood-affected locations (9, 22). Relative to Sphere's 2,100-kilocalorie benchmark, however, the value of these transfers was frequently inadequate. When funding gaps widened in 2022, WFP announced that a large segment of its Yemeni caseload, around eight million people, would be shifted to half rations; similar OCHA and WFP reporting indicates that only a minority of remaining recipients continued to receive the full caloric value of the standard basket (6, 10, 15). Aggregating across the 2020–2024 period and interpreting half rations as delivering roughly 1,050 kilocalories per person per day, well over half of all monthly transfers provided through U.S.-backed general food assistance in Yemen fell below Sphere's energy standard, even before accounting for intra-household sharing or market price inflation (4,8,10). Comparable patterns emerge for South Sudan: repeated ration reductions and the suspension of assistance for roughly 1.7 million people in 2022 mean that a substantial share of potential beneficiaries either received no transfer or one that delivered only 40–60% of Sphere's minimum energy requirement (9, 24).

USAID sought to mitigate these shortfalls by increasing the efficiency and flexibility of its assistance. Over the period, it gradually shifted from depending on U.S.-sourced goods to cash-based transfers and local and regional purchasing, wherever markets could support them. Evaluations by Lentz et al. have shown that, under the right conditions, cash and vouchers can provide equal or better food access at 10–15% lower cost per beneficiary than imported aid, mainly because they avoid costs related to ocean freight, port handling, and in-country storage (12). Earlier work by GAO on local and regional procurement estimated that purchasing cereals in or near affected regions could shorten delivery times by about twelve weeks and cut landed costs by up to 25–30% compared to shipments from the U.S., although the savings varied widely across different pilot contexts (13). However, these estimates are from before 2010. They are not used as direct point estimates for Yemen and South Sudan; instead, they offer a range of possible efficiency gains. Recent WFP Executive Board reporting on cash shows that similar savings have been achieved in several contemporary crises as cash-based assistance has scaled (14). In Yemen's more stable urban and peri-urban markets, USAID-funded cash and voucher projects helped households slightly diversify their diets compared to in-kind rations; monitoring indicated increases of one to two food groups in household dietary-diversity scores at similar transfer values (10, 12, 14). In South Sudan, where markets are limited and access is more volatile, USAID often kept in-kind commodity pipelines running and supported targeted nutrition programs and procurement of specialized foods (11, 25).

European Union: funding, policy influence, and modality mix

The EU, principally through its Directorate-General for European Civil Protection and Humanitarian Aid Operations (DG ECHO), was the second-largest donor bloc in both crises after the United States. WFP funding data show that EU institutions and member states contributed several hundred million euros to Yemen and South Sudan between 2020 and 2024, usually ranking among the top three donors to WFP in each country each year (7, 9). ECHO leveraged this financial weight to promote particular approaches, especially cash-based assistance and nutrition-sensitive programming. Its policy guidance encouraged partners to use cash or vouchers where markets were functional and to integrate nutrition goals, such as treating child wasting or providing micronutrient supplements, into broader food-security programs (12, 14, 26).

In Yemen, ECHO-funded multipurpose cash programs in urban areas enabled households to purchase more diverse food baskets than standard ration packs, especially when transfers were indexed to local food-

price inflation. WFP and NGO monitoring reports from 2022 to 2024 show that these programs often achieved higher food-consumption scores at a similar or lower cost per beneficiary compared to in-kind distributions, aligning with broader evidence on cash transfers (10, 12, 14). In South Sudan, the EU supported initiatives that combined food or cash transfers with nutrition counseling and micronutrient supplementation. One voucher scheme in Lakes State, for example, linked household food vouchers to the provision of micronutrient powders for young children and reported reductions in child anemia over a one-year period (26–29). These experiences illustrate the potential of donor policy conditionality to steer operational agencies toward modalities that are both more cost-efficient and more nutrition-sensitive.

At the same time, EU funding was subject to the same macro-level constraints as other donors. Despite its emphasis on efficiency, ECHO could not by itself close multi-billion-dollar global funding gaps. In Yemen, even with increased use of cash and local procurement, WFP and partners were still forced to cut rations below Sphere standards for most beneficiaries once overall resources fell (4, 6, 10). In South Sudan, ECHO-supported pilot programs functioned as pockets of relatively well-resourced assistance within a broader response that, during funding troughs, frequently provided reduced rations, or no transfer at all, to large portions of the population (9, 24, 26). The EU's humanitarian record highlights both the importance of progressive methods and the limits of efficiency improvements under chronic underfunding.

UN system: operational performance and nutrition outcomes

WFP and UNICEF were responsible for turning donor contributions into concrete on-the-ground transfers. WFP managed the bulk of general food assistance and cash-based programs, while UNICEF worked on the prevention and treatment of acute malnutrition in young children and pregnant and lactating women (9, 11). WFP's operation in Yemen was the agency's largest worldwide for much of the period; even after successive ration cuts, it was still reaching about 8.6 million people per month in 2024, down from a pre-cut peak of roughly 13 million (6, 10). In South Sudan, WFP planned to assist approximately 6.8 million people in 2024, relying on road, river, and air transport to overcome seasonal flooding and insecurity (9, 22). UNICEF complemented these efforts by procuring the vast majority of global RUTF supplies, around 75–80% of the market, used to treat severe acute malnutrition, and by supporting community-based management of acute malnutrition programs and micronutrient supplementation (11).

Measured against Sphere standards, UN-led transfers prevented widespread famine but fell short of delivering consistent nutritional adequacy. The prevalence of half or reduced rations described above implies that, in many months, recipients effectively obtained only about 1,050–1,500 kilocalories per person per day—roughly half to two-thirds of Sphere's 2,100-kilocalorie standard (4–6, 8–10, 15). On protein and micronutrients, the picture is similarly mixed. Standard general food-assistance rations in both countries were heavily cereal-based, with limited inclusion of pulses and fortified blended foods once funding tightened (4–6, 9, 10, 15). Sphere's recommendation that 10–12% of energy come from protein was sometimes met on paper in full-ration periods, but cuts tended to fall disproportionately on more expensive items such as pulses, animal-source foods, and specialized nutritious products (8, 15). As a result, many households received transfers that were both calorie-insufficient and nutritionally lacking.

UNICEF-led programs partially offset these gaps for the most vulnerable. Treatment coverage for severe acute malnutrition among children under five increased over the period as RUTF supplies expanded; UNICEF market reports show rising annual procurement volumes, and program data from Yemen and South Sudan record hundreds of thousands of admissions per year (9, 11, 25). Evidence from Cochrane and WHO reviews suggests that home fortification of complementary foods with multiple micronutrient powders can significantly reduce anemia and improve iron status among young children (28, 29). In both study countries, such powders and other supplements were deployed, particularly in EU- and USAID-funded "cash-plus" or nutrition-sensitive projects, but coverage remained far below universal (25–30). National trends in stunting and anemia thus changed slowly, if at all, over the 2020–2024 window (1–6, 9).

Based on Sphere standards, UN operations therefore achieved very high coverage of some life-saving nutrition services for children with severe wasting, but could not ensure that the broader population consistently accessed diets that met basic requirements for energy, protein, and micronutrients. Viewed together, the performance of the United States, the UN system, and the EU reveals a consistent pattern. Their combined efforts undoubtedly averted much larger death tolls in both Yemen and South Sudan and stabilized aggregate food-security indicators at "crisis" rather than "catastrophe" levels. Yet because

rations and transfers often fell well below Sphere's 2,100-kilocalorie standard, and often did not provide enough protein and micronutrients, they did not meet Sphere's minimum requirements for nutritional security for most recipients (2–5, 8–10). The next section outlines the common challenges that emerge from Yemen's and South Sudan's experiences and maps how those insights can drive global reforms in food-aid policy.

CROSS-CUTTING CONSTRAINTS AND IMPLICATIONS FOR FOOD-AID POLICY

The country- and provider-specific analysis points to a set of structural constraints that recur across Yemen and South Sudan. This section synthesizes those patterns, using them to draw cautious inferences about what current food-aid instruments can and cannot deliver under prevailing political and fiscal conditions. Rather than offering prescriptive recommendations, it identifies areas where marginal changes in policy or financing are most likely to increase the probability that emergency transfers meet Sphere standards.

Chronic underfunding and volatility

The most pervasive constraint is the gap between assessed needs and available resources. Across 2020–2024, consolidated appeals for Yemen and South Sudan were funded at levels well below 100%; in some years, Yemen's food-security and livelihoods sector received barely half of the requested resources (1, 4, 9, 24). The cumulative shortfall for Yemen alone amounted to several billion dollars relative to appeal targets (1, 4). WFP has estimated that every US$100 million in missing funds translates into tens of thousands of tons of cereals not procured, with potential coverage losses in the high hundreds of thousands of people for half a year (9, 14, 15). In both countries, underfunding manifested directly in reduced ration sizes, suspended distributions, and tighter geographical prioritization.

The trajectory of these shortfalls matters just as much as their overall scale. Because the bulk of humanitarian funding is still pledged on an annual basis, agencies are exposed to year-to-year volatility. In Yemen, this produced repeated cycles in which WFP announced ration cuts, restored some funding when new funds were pledged, and then cut again when the pipeline weakened (4–6, 10, 15). In South Sudan, the 2022 suspension of assistance for 1.7 million people illustrates how fluctuations in donor support can force abrupt changes in coverage (9). From a Sphere perspective, these patterns imply that even where average annual funding appears substantial, the month-to-month energy and nutrient intake that households obtain from aid may oscillate well below minimum standards. Improving the predictability and multi-year nature of funding would not guarantee adequacy, but it would reduce the frequency with which agencies must respond to sudden financing gaps by cutting rations across the board.

Limited but meaningful efficiency gains

A second constraint concerns the potential and the limits of efficiency gains from cash-based assistance and local or regional procurement. The evidence from Yemen, South Sudan, and the wider literature suggests that, under appropriate conditions, these can reduce cost per beneficiary and improve diet quality. Meta-analyses of international food-assistance instruments conclude that cash and vouchers often deliver comparable or better food-security outcomes at lower administrative and logistical costs than imported in-kind aid, particularly in urban areas with functioning markets (7, 9, 12, 14). GAO's 2009 assessment of early local and regional procurement pilots found that buying cereals in nearby countries shortened delivery times by around twelve weeks and reduced landed commodity costs by up to 25–30% relative to U.S.-sourced shipments in several cases, though savings varied widely by context (8, 13). These figures derive from an earlier period and are not directly extrapolated to the 2020–2024 Yemen and South Sudan operations, but they indicate the plausible size of gains that can be realized when market conditions permit.

The case studies broadly align with these orders of magnitude. In Yemen's urban areas, multipurpose cash transfers funded by USAID and the EU generally achieved higher or similar food-consumption scores at equal or lower nominal cost per recipient than standard food baskets, even before accounting for beneficiaries' ability to allocate some cash to non-food essentials (5, 7, 9, 10, 12, 14). In South Sudan, the scope for such programming was more limited, but voucher schemes and regional procurement of staples like sorghum and maize still yielded logistical efficiencies compared with importing all commodities from distant ports (9, 12, 26). However, the absolute impact of these efficiencies on ration size remains constrained by the scale of the funding gap. A 10–20% reduction in per-beneficiary delivery cost is significant, yet it cannot fully offset scenarios in which appeals are funded at only half their requested level. The implication is that while donors and agencies should continue to pursue cost-effective

modalities, they cannot rely on efficiency improvements alone to bring transfers up to Sphere standards when overall funding levels remain insufficient.

Accountability, targeting, and leakage

Given resource scarcity, the way assistance is targeted and monitored becomes critical. Both Yemen and South Sudan illustrate the trade-offs that agencies face between breadth of coverage and depth of support. In Yemen, WFP's decision in 2022 to reduce rations for most of its general food-assistance caseload rather than exclude entire categories of recipients was based on internal modeling of the mortality implications of different options. Although detailed scenario calculations are not public, the agency has indicated that spreading reduced rations across a larger number of households was expected to avert more deaths than concentrating full rations on a smaller group (4–6, 10). In South Sudan, by contrast, the 2022 suspension of assistance for 1.7 million people reflected a decision to focus remaining resources on those in the most severe IPC phases, at the cost of leaving others with no aid (9, 24, 25). Both approaches are defensible under different prioritization principles, but each implies a different distribution of shortfalls relative to Sphere standards: either many people receive too little, or some receive nothing.

Improvements in accountability systems can expand the effective coverage of available resources by reducing leakage. The gradual rollout of biometric registration systems such as WFP's SCOPE platform has enabled agencies to identify duplicate or "ghost" beneficiaries and to link transfers to individual identities (30). In South Sudan, data sharing between WFP and the International Organization for Migration enabled the agencies to reconcile beneficiary lists, remove duplicates, and thereby free up food for tens of thousands of additional people without increasing budgets (31). World Bank estimates from other countries suggest that robust digital identification systems can generate public-sector savings equivalent to several percentage points of spending by reducing fraud and subsidy leakage, though the exact magnitude depends on context (32). In Yemen, the rollout of biometrics has been slower, in part because of resistance from de facto authorities in some areas, but where implemented, it has similarly reduced opportunities for politicized interference in beneficiary lists (4–6, 10, 17). Accountability is not a substitute for adequate funding or safe access; nevertheless, these experiences indicate that investments in transparent targeting criteria, biometric registration, third-party monitoring, and community feedback mechanisms can noticeably increase the share of aid that reaches intended recipients, and therefore the proportion of assistance that approaches Sphere energy and nutrition standards.

Political access constraints

Operational constraints in both countries were shaped at least as much by politics as by logistics or technology. In Yemen, the 2018 Stockholm Agreement over the reopening of the port of Hodeidah demonstrated how diplomatic arrangements can secure vital humanitarian corridors even amid ongoing conflict: at various times during the year, up to 70% of Yemen's commercial and humanitarian imports passed through the port (16, 18, 19). Yet the April 2024 warehouse looting in Saʿada, and WFP's subsequent suspension of operations in Houthi-controlled areas, highlighted how quickly access gains can be reversed when parties to the conflict view aid as a resource to be appropriated or leveraged (17). In South Sudan, OCHA's 2024 access snapshot documented dozens of incidents in a single month, including violent attacks on staff, looting of stocks, and bureaucratic obstruction (23). Human Rights Watch has similarly reported patterns of extortion and political interference with humanitarian operations at sub-national levels (20, 21).

These dynamics mean that, even when funding and technical capacity are sufficient on paper to provide Sphere-compliant rations, agencies may be unable to move food or cash to the locations and populations who need them. The reliance on costly airdrops in flooded or insecure areas of South Sudan illustrates both the physical barriers to access and the security risks of operating in contested zones (9, 22, 23). From a policy standpoint, this underscores that improvements in funding, modality choice, and accountability need to be accompanied by sustained and coordinated political engagement aimed at safeguarding humanitarian space, whether through ceasefire arrangements, negotiated access corridors, or consistent diplomatic pressure on parties that divert or obstruct aid. The extent of such engagement depends on the wider geopolitical environment and on donors' willingness to invest political capital, factors outside this paper's scope but still critical in shaping what can be achieved on the ground.

Nutritional quality and outcome indicators

A fourth cross-cutting issue is the relative neglect of nutritional quality in the design and monitoring of general food-assistance programs. Sphere standards

emphasize not only total calories but also the proportion of energy from protein and fat and the adequacy of micronutrient intake, yet most routine reporting focuses on tonnage delivered, numbers of people reached, and, at best, household-level food-consumption scores (5, 8, 10). In both Yemen and South Sudan, general rations were heavily weighted toward cereals and vegetable oil, with more nutrient-dense components scaled back as funding tightened (4–6, 9, 10, 15–17). This pattern helps explain why, even among households receiving assistance, IPC and survey data show persistent or rising rates of child wasting, growth stunting, and anemia (1–5, 9).

UNICEF's targeted nutrition interventions, including community-based treatment of acute malnutrition with RUTF and micronutrient supplements for children and pregnant women, produced clear gains for beneficiaries, consistent with global findings (6, 11, 28, 29). However, coverage remained limited relative to need, and these programs were often treated as adjuncts to, rather than integral components of, general food-assistance strategies (12, 25–27, 30). In operational terms, this meant that decisions about ration composition during pipeline crises were driven primarily by the desire to maximize calorie coverage at minimum cost, with less explicit consideration of the impact on protein and micronutrient intake. From an analytical perspective, the case studies suggest that systematically incorporating nutrition indicators—notably rates of wasting and stunting in children, alongside anemia prevalence, as well as dietary-diversity scores—into performance frameworks for humanitarian food programs would provide a more complete picture of alignment with Sphere standards and could influence procurement choices over time. Doing so would, however, require donors and agencies to accept potentially higher unit costs to protect more expensive, nutrient-dense commodities from disproportionate cuts when funding tightens.

Anticipatory action and timing of response

Finally, the experience of Yemen and South Sudan illustrates both the promise and the current limitations of anticipatory action. Globally, forecast-based financing and anticipatory-action frameworks have proliferated; by 2024, more than 150 such frameworks were in place across dozens of countries (33). The underlying rationale is that releasing funds ahead of predicted shocks, such as floods, droughts, or market price spikes, can reduce both human suffering and the eventual cost of response by preserving livelihoods and nutritional status. In practice, anticipatory mechanisms played only a modest role in the two crises examined here. In South Sudan, for example, early-warning systems clearly signaled the likelihood of repeated severe flooding, yet large-scale support to vulnerable households often arrived only after assets and harvests had already been lost (21–23, 24, 25, 33). In Yemen, IPC projections and macro-economic monitoring provided early indications of impending deterioration, but funding and access constraints meant that significant scaling-up of assistance typically occurred only once populations were already in IPC Phase 3 or higher (1, 2, 4, 18, 19, 24).

Pilot initiatives were tested, though. Agencies pre-positioned food in flood-prone counties in South Sudan ahead of the rainy season and explored trigger-based cash transfers in parts of Yemen where market access was expected to deteriorate if conflict escalated (24, 25, 33). Yet these pilots remained small relative to overall caseloads and were often financed from the same limited pools of humanitarian funding that had to cover reactive responses. Without ring-fenced resources that can be released automatically when agreed thresholds are met, anticipatory action competes with immediate needs and is difficult to sustain at scale. The implication is not that anticipatory approaches are ineffective—global evidence suggests they can be highly cost-efficient in appropriate contexts (33)—but that, in Yemen and South Sudan between 2020 and 2024, they did not yet drastically change the trajectory of hunger or bring average transfers closer to Sphere standards. Moving from pilots to systematic use would require institutional changes in how donors allocate risk financing and how agencies integrate early-warning information into program design.

Taken together, these cross-cutting constraints help explain why large-scale humanitarian operations in Yemen and South Sudan were able to avert famine for millions, yet were unable to ensure that most recipients received assistance meeting Sphere's minimum energy and nutrition standards. The concluding section reflects on the broader implications of this pattern for future food-aid policy.

CONCLUSION

The comparative assessment of Yemen and South Sudan between 2020 and 2024 yields a sobering picture of what contemporary humanitarian food assistance can achieve under conditions of protracted conflict, climatic shocks, and structural underfunding. Both countries exemplify crises in which more than half of the population was classified in IPC Phase 3 or worse

for much of the period, and in which malnutrition indicators remained at or above emergency thresholds despite intensive external engagement (1–5, 9). Against this backdrop, the combined efforts of USAID, the UN system, and the EU clearly mattered. Large-scale general food assistance and targeted nutrition programs helped to avert widespread famine, stabilized food-security trajectories at crisis rather than catastrophe levels, and provided life-saving treatment for hundreds of thousands of severely malnourished children (4–6, 9, 11, 25).

At the same time, measured against Sphere's 2,100-kilocalorie and associated nutrition standards, the operations examined here fell substantially short of ensuring basic nutritional adequacy for most recipients. Chronic funding gaps meant that rations were repeatedly cut to half or less of the standard energy value, and transfers often omitted or scaled back protein-rich and micronutrient-dense foods (4–6, 8–10, 15–17). Post-distribution monitoring confirms that many households receiving assistance still reported poor or borderline food-consumption scores, while national surveys show little progress on key outcome indicators such as acute wasting, linear growth faltering (stunting), and anemia among children (1–5, 9, 10, 16, 29, 30). These findings suggest that averting famine and achieving Sphere-compliant nutrition security are related but distinct objectives, and that current resource levels and delivery models are more consistently able to accomplish the former than the latter.

The cross-cutting analysis highlights several areas where adjustments to policy and practice could increase the likelihood that emergency food aid meets minimum standards, while recognizing the political and fiscal constraints donors face. Greater use of multi-year and more predictable financing would reduce the volatility that currently drives ration cycles, even if it does not fully close overall funding gaps. Continued expansion of cash-based assistance and local procurement, where market conditions permit, can generate meaningful efficiency gains and modest improvements in diet diversity, provided they are accompanied by robust safeguards and protection for market functioning (7–9, 12, 14). Investments in accountability systems, including biometric registration and transparent targeting criteria, can reduce leakage and make scarce resources go further, though they require careful negotiation in politically contested environments (30–32). Efforts to safeguard humanitarian access through diplomacy and conflict-sensitive programming are essential complements to technical and financial reforms, particularly in settings where aid is routinely obstructed or instrumentalized (16–18, 20–23, 24). Finally, systematically incorporating nutrition indicators and anticipatory approaches into performance frameworks may, over time, shift incentives toward earlier, more nutrition-sensitive responses, even if their short-term impact remains limited by available funds (6, 11, 25, 28, 29, 33).

No single measure is likely to be transformative on its own, and each faces implementation challenges. Together, however, they point toward a more realistic understanding of what humanitarian food assistance can achieve: not the elimination of crisis-level hunger in contexts as complex as Yemen and South Sudan, but the reduction of avoidable shortfalls relative to agreed minimum standards. By clarifying the relationship between financing, modality choices, operational constraints, and nutritional outcomes, the analysis underscores that progress toward Sphere-compliant assistance will depend on both increased resources and more deliberate choices about how those resources are used.

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CONFLICT OF INTEREST

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