A developing food crisis and potential refugee movements

At least 30 million people in three African countries and Yemen are experiencing severe food insecurity. To rapidly scale-up international aid, we should acknowledge the systemic risk implied in food insecurity by looking at, for example, potential international refugee movement.

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Globally, nearly 124 million people faced levels of food insecurity categorized as crisis or worse across 51 countries and territories in 2017[1]. In this setting, an acute food crisis[2] is ongoing in Nigeria, Somalia, South Sudan and Yemen, where at least 30 million people urgently need food assistance, including over 10 million people on the brink of famine[3–7] (Supplementary Table 1). The funding needed for humanitarian assistance in these four countries was US$6.5 billion in 2017, which went 29% unmet[1]. In fact, the World Food Programme — the leading humanitarian agency fighting global hunger — continues to face budget shortfalls in 2018 as the numerous food crises around the globe overwhelm budgets for humanitarian efforts in donor countries[8]. Despite some success in warding off famine through emergency food assistance (for example, in Nigeria and South Sudan) the situation remains dire.

Today, the primary common catalysts for food insecurity in each of these countries are conflict between armed groups in settings with low social resilience[9], political indifference and dim prospects for rapid conflict resolution[10]. In northeastern Nigeria, the cumulative impacts of the nine-year conflict between the Nigerian government and militant Boko Haram have devastated the region, leading to mass displacement, human rights violations and now severe food insecurity[11]. Somalia continues to suffer from the effects of a protracted civil war and endured serious droughts in 2016 and 2017[12]. Fighting in South Sudan has left more than 6.3 million people severely food insecure[5]. Just as disconcerting is Yemen, a country on the verge of collapse, because civil war and an associated military blockade of Yemen's ports have completely undermined the country's food supply, resulting in 17.8 million food-insecure people in this country alone[6,7,10] (Supplementary Information).

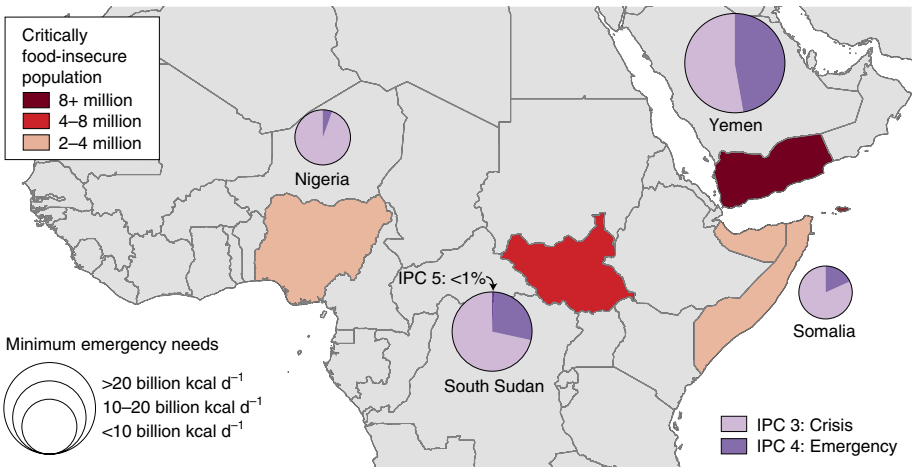

Fig. 1 | The emergency food situations in Nigeria, Somalia, South Sudan and Yemen. Number of critically food insecure people — along with an estimate of their total emergency food needs — for early 2018 in Nigeria, Somalia, South Sudan and Yemen[3–7].

Food insecurity and aid

The international community has first and foremost a humanitarian obligation to assist these severely food-insecure populations. The stakes are especially high considering that an estimated 258,000 lives were lost during Somalia's most recent famine in 2011, with more than half of the deaths occurring before the formal declaration of famine[13]. Intervention must therefore occur before famine conditions emerge to prevent massive loss of life.

Although not perfect[14], the Integrated Phase Classification (IPC) is useful in this regard. This is a five-phase scale comprising indicators of food consumption, livelihoods, malnutrition and mortality. Acute food insecurity is widespread and increasingly severe during IPC phases 3 (crisis) and 4 (emergency) with phase 5 being reserved for famine. Figure 1 shows the numbers of critically food-insecure people in these two pre-famine phases as well as the 50,000 people experiencing famine in South Sudan. Overall, the risk of famine (IPC 5) remains high. Besides the population numbers, the total amount of food needed is substantial. Assuming an emergency diet of 2,300 kcal person^{-1} d^{-1} (Supplementary Information), we estimate that the total caloric needs of the food-insecure populations are 8.5 billion kcal d^{-1} in Nigeria, 6.3 billion kcal d^{-1} in Somalia, 15 billion kcal d^{-1} in South Sudan and 41 billion kcal d^{-1} in Yemen.

Ideally, the immense scale of suffering in these countries should, in and of itself, be enough to motivate the international community to act now to alleviate the developing famine and health crises. Indeed, high prevalence rates of acute malnutrition and associated premature mortality, especially among children under five in refugee camps, are preventable. Yet in a complex geopolitical landscape with multiple international crises and, amidst them, innumerable ongoing and emerging humanitarian crises that surpass current aid budgets of donor nations, it is difficult

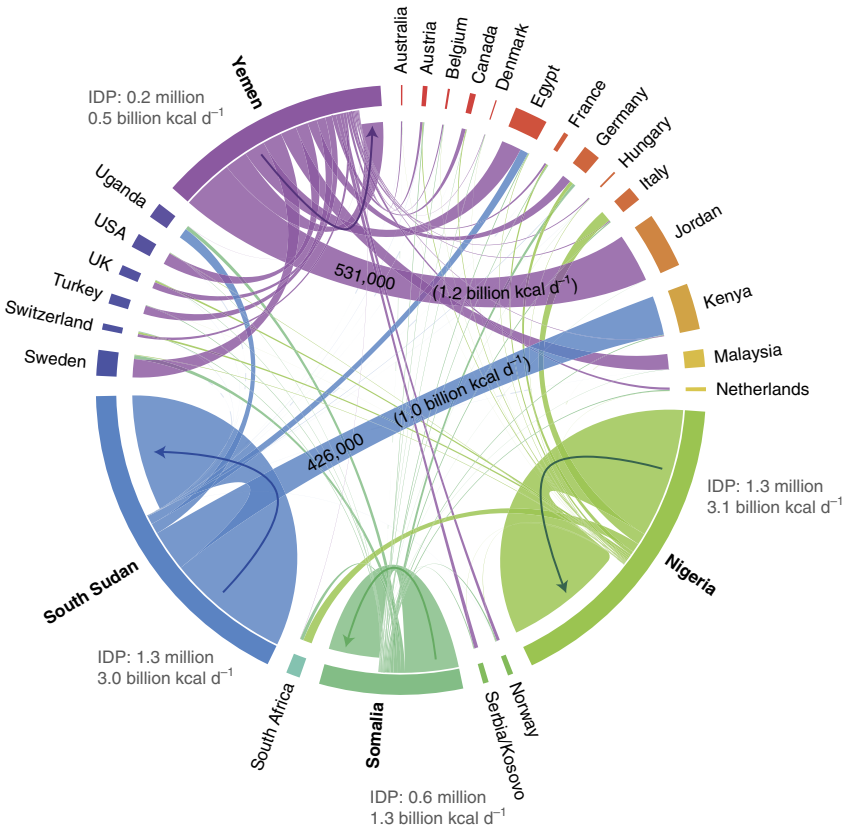

Fig. 2 | An illustrative example of potential global refugee movement (and the total associated emergency food needs) due to the emergency food situations in Nigeria, Somalia, South Sudan and Yemen. We assume a refugee outflow rate equal to 10% of the critically food-insecure population in each of the four countries. Flows are computed assuming the refugees are from the existing IDP population and follow the average pathways of asylum seekers for the years 2011–2015. Bilateral links are included only if the historical refugee flows were, on average, greater than 10,000 people.

to galvanize and scale-up international responses to severe food emergencies. Without a new funding paradigm to increase financial commitments to meet the magnitude, intensity and extent of current and future crises, our capacity to respond to food-security emergencies will remain insufficient.

Systemic risk and migration

We can achieve a paradigm shift by recognizing that severe food insecurity increases systemic risk in our globalized society. Systemic risk is defined as the threat from an individual event or cluster of events due to a 'domino' or 'multiplier' effect in an interconnected system[15]. It arises due to interactions that are generally unexpected and lead to impacts that can threaten the stability of the entire system.

A prime example of food insecurity affecting systemic risk is through its influence on the movement of people, whether within a country (that is, internal displacement) or internationally (that is, refugees or migrants). Indeed, mobility is a fundamental strategy to cope with resource scarcity[16]. Viewed through the lens of systemic risk, alleviation of severe food insecurity is no longer solely a humanitarian endeavour. Instead, it is essential for stability of the world's interconnected social and economic systems.

From a systemic risk perspective, the current food-crisis situation introduces additional instability into an already fragile region. Consider the number of people who have moved within the affected countries (referred to as internally displaced persons, IDPs) as of 2017: 1.7 million in Nigeria, 0.83 million in Somalia, 1.9 million in South Sudan and 2.0 million in Yemen[17]. The presence of so many IDPs suggests that people in these countries are especially vulnerable. Prolonged and/or deteriorating food scarcity could trigger further refugee movement out of these countries.

Countries experiencing the highest food-insecurity levels together with armed conflict tend to have the largest number of IDPs and outward flow of refugees[18]. However, we do not have the ability to precisely predict the movement of people. In part, this is because no consensus yet exists among migration experts about the environmental drivers of migration — including scarcity of resources like food — in the broader context of populations' response to environmental, social and economic changes[19]. More fundamentally though, refugee movement is the outcome of numerous and complex economic, social, political and environmental interactions, which generally undermine our ability to predict individual events[20].

Despite our limited predictive capacity, we can still explore the potential scope of the current food insecurity crisis if left unchecked. We suggest that the global community could face an emergent global-scale crisis if current levels of food insecurity are allowed to continue or worsen. In Fig. 2, we present an illustrative scenario for potential global refugee movement and the associated caloric food needs of the refugees from these four countries (Supplementary Information). For each country, we assume that 10% of the food-insecure IDP population will cross the border to seek asylum in other countries. We select this approximate rate, because typically people affected by severe and sudden food scarcity or extreme events (for example, flooding, drought) will also be either trapped in place or remain displaced within the country[21]. For the 10% who seek asylum internationally, we identify potential destinations using historical asylum seeker data from 2011–2015, assuming that refugee flows tend to follow previous refugee pathways[22]. We emphasize that both the 10% rate and the potential destinations are meant to be illustrative rather than predictive examples for short timescale (<1 year) refugee movement.

In our illustrative scenario, the largest numbers of international refugees are from Yemen (1.8 million) followed by South Sudan (0.63 million), Nigeria (0.37 million) and Somalia (0.27 million). Jordan experiences the greatest influx of refugees, mostly from Yemen. Within the African continent, primary destinations for refugees are Kenya, Egypt, South Africa and Uganda. The top destinations outside of the continent include Italy, Sweden, Germany, Malaysia, USA and UK.

To provide context for our illustrative scenario, the United Nations High Commissioner for Refugees (UNHCR) estimates that there are almost 2.5 million refugees from South Sudan in its six neighbouring countries (with over 1 million in Uganda alone) and expects the number to increase to 3.1 million by the end of 2018[23]. With 0.63 million refugees

in total (that is, to all countries), our 10% illustrative scenario clearly underestimates South Sudanese refugee movement. Further, UNHCR calculates that there are already about 218,000 refugees from Nigeria in Cameroon, Chad and Niger alone[11]. Yet our illustrative example does not include refugee movement to these neighbouring countries, which highlights the limitations of using historical asylum seeker data for potential destinations.

Way forward

The frequency and severity of food insecurity crises is expected to increase given the pressures on our global food system. This is especially true in Africa, where stressors (such as violent conflict) are accumulating, per capita food production is projected to decline and crop production is threatened by climate-related pressures[24]. In such a setting, localized food-insecurity crises could trigger international refugee movement, which would likely impact countries already struggling with existing refugee populations and magnify the potential for further social unrest and economic instability.

The UN Office for the Coordination of Humanitarian Affairs indicates that additional funding to strengthen the humanitarian response is one of four specific changes needed to overcome the developing crisis in these four countries[25]. However, there seems to be no impetus for such a change. To transition from the business-as-usual humanitarian strategy to a more effective and proactive approach, we argue that emphasizing the global, systemic-risk dimension of this crisis is the way forward.

The key idea is that building up an effective international response to this food emergency will not only save numerous lives in Nigeria, Somalia, South Sudan and Yemen, but will also enhance both regional and global stability. For example, migration policies should be coordinated with scaled-up regional and international responses that prevent food security crises from directly or indirectly driving new refugees and migrants. Critically though, for any response to be considered effective, we must first ensure that proposed interventions will not worsen the situation. More generally, this humanitarian crisis is an important opportunity for the international community to begin to address a uniquely twenty-first century challenge associated with continuing food insecurity crises occurring amidst rapid growth in global interconnectivity in terms of human mobility, trade and information exchange. ❐

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Author contributions

M.J.P. designed the research, compiled the food security and asylum-seeker data and estimated the refugee movements and associated food requirement. The paper was written together with contributions from all authors.

Additional information

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