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INNOVATX Global Health Case Competition 2025 – Presented by McMaster Friends of Médecins Sans Frontières



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"Research in Earnest"

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Abstract

McMaster Friends of MSF (FoMSF) is a student-led club at McMaster University that supports Médecins Sans Frontières (MSF) Canada, a humanitarian relief-based organization that helps countries across the world. McMaster FoMSF organized the INNOVATX Global Health Case Competition to provide undergraduate students with the chance to problem-solve, enrich their skills, and above all, gain valuable exposure to current global health contexts. This year's competition focused on food insecurity in Yemen, and participants were asked to describe one health issue related to the topic and propose a plan on how MSF can better address this issue. After a round of written submissions and another round of live presentations, the briefing notes from the three winning teams have been published in this conference book. To learn more about McMaster FoMSF or the INNOVATX Global Health Case Competition, please visit our Instagram ([@mac_fomsf](https://www.instagram.com/mac_fomsf)) page.

Disclaimer: The views expressed throughout this case competition and publication are solely those of the INNOVATX participants and do not reflect those of McMaster FoMSF, MSF Canada, McMaster University, or any other organization.

Keywords: global health; humanitarian aid; food insecurity; yemen; health innovation; case competition; undergraduate research

Table of Contents

First Place	Pg: A02-A02
Addressing Acute Malnutrition in Yemen: Revitalizing Nutrition with <i>Wolffia globosa</i>	Pg: A02-A02
Second Place.....	Pg: A02-A03
Amal Al Sagheer (أمل الصغير): Addressing Malnutrition in Yemen Through Culinary and Medical Aid Initiatives	Pg: A02-A03
Third Place	Pg: A03-A04
A Comprehensive Multi-Phase Intervention Addressing Iron Deficiency Anemia (IDA) in Pregnant Women in Yemen.....	Pg: A03-A04

Conference Abstracts

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First Place

Addressing Acute Malnutrition in Yemen: Revitalizing Nutrition with *Wolffia globosa*

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In Yemen, 120 000 children under the age of five suffer from severe acute malnutrition. Civil conflict since 2014 has led to a depletion of agricultural infrastructure and food distribution systems. Even with the limited infrastructure for food cultivation, biased crop choice has further exacerbated food insecurity. Around 60% of arable land and groundwater is used to produce khat, a recreational stimulant with minimal nutritional benefits. Khat production is prioritized by farmers due to its demand and employment opportunities. The prioritization of khat has limited the production of other nutrient rich crops. A potential solution to this issue is to introduce low-maintenance, high-yielding crops that have a limited influence on khat production. *Wolffia globosa* is an aquatic plant that has the potential to become a novel food source to combat nutritional deficiencies in malnourished populations. *Wolffia* is a genus of 11 miniature, rootless, flowering duckweed species found globally. The smallest species of the *Wolffia* genus — *W. globosa* — particularly draws interest because of its excellent nutritional value. *W. globosa* is 48.2% crude protein by dry weight, making it comparable to many animal sources of protein. More importantly, *W. globosa* is a high-quality protein source that contains all nine essential amino acids. It is one of the few natural plant sources of vitamin B12, has high amounts of mineral content, antioxidants, and dietary fibres, which can be especially beneficial for children suffering from gastrointestinal (GI) complications. *Wolffia* species propagate rapidly, with doubling times as little as under two days, making them ideal for mass cultivation. *W. globosa* is also able to thrive in eutrophicated, poor water-quality conditions. The primary consideration to be made with Yemen is the availability of freshwater to sustain its cultivation. The agricultural sector already encompasses 90% of Yemen's water use, with groundwater being alarmingly depleted. From an economic and resource perspective, the best approach to implementing *W. globosa* cultivation would likely be to utilize existing hydroponic infrastructure in Sana'a, the capital city of Yemen. Given the minimal flavour of *W. globosa*, it can be incorporated into many cultural Yemeni meals. Traditional dairy-based drinks like Laban and Rayeb, soft foods like Aseedah, and bread staples like Malooga can be fortified with *W. globosa*. Another possible application of *W. globosa* would be to incorporate it into baby formula, especially considering the declining number of breastfeeding mothers in Yemen. To monitor the outcomes of this initiative, we can consider the reduction of vitamin B12 deficiencies and GI issues in children as points of improvement. Vitamin B12 has a major influence on the integumentary system, enhancing hair, nail, and skin health. It takes approximately 4-6 weeks for the integumentary system to improve. These improvements can be visually inspected. Furthermore, GI issues caused by malnutrition should improve with the consumption of *W. globosa*. Therefore, a physical assessment with questions about gastrointestinal health within a 4–6-week period would provide a valid outcome measurement. With careful monitoring, introducing *W. globosa* as a novel food source has the capacity to address the malnutrition crisis in Yemen.

Second Place

Amal Al Sagheer (أمل الصغير): Addressing Malnutrition in Yemen Through Culinary and Medical Aid Initiatives

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Yemen is currently grappling with one of the most severe humanitarian crises in the world. A staggering 17.1 million people are food insecure, and 4.5 million have been displaced due to conflict, economic decline, and breakdown of social services. The situation is dire, with 2.2 million children under the age of five suffering from stunting, leading to serious health complications and weakened immunity. The health sector is in a state of deterioration, with over half of the health facilities non-functional. This means that millions of people are deprived of basic health care, vaccinations, and mental health services. The challenges are further exacerbated by import restrictions, particularly in Houthi-controlled areas, leading to food shortages and limited access to essential healthcare products. “Amal Al Sagheer” (أمل الصغير) is a sustainable community-based initiative to address these urgent needs through two integrated components: Emergency Nutrition and Medical Assistance. The Emergency Nutrition program will employ volunteer chefs who provide displaced populations with 250,000 high-protein, energy-dense meals each month. This is not just a food distribution program. Still, a specific malnutrition

prevention and control program for vulnerable individuals and ages, such as children and pregnant women, to receive fortified meals rich in nutrients to cure acute and chronic conditions. Protein, carbohydrates and micronutrient sources such as rice, lentils and chickpeas will be incorporated into the meals. To this end, the kitchens will use solar-powered cooking equipment to minimize reliance on traditional fuels and deploy the units in off-grid and remote regions. Hence, since there is no fuel and other low logistical costs, more resources can be put into purchasing quality ingredients. The Medical Assistance initiative will include a team of doctors, nurses, and mental health workers who will go check on the growth, vitamins, and immune systems for children and prenatal and postnatal care for pregnant women. “Amal Al Sagheer” acknowledges the cultural barriers to health care, including women, making it possible for women to get the necessary services in a culturally sensitive way. “Amal Al Sagheer” includes healthcare workers and implements the program in Ma’rib, where more than 900,000 displaced persons are in dire need. With an estimated \$5 million annually for meal healthcare and logistics, 70% will be allocated to food production and healthcare, 20% to logistics, and 10% to monitoring. Additionally, partnerships with Médecins Sans Frontières (MSF) and the International Committee of the Red Cross (ICRC) will overcome political barriers and secure access to conflict zones. As for long-term, community-based solutions, “Amal Al Sagheer” seeks to fight malnutrition, decrease mortality, and improve the health of Yemen's populations most in need. This initiative offers a scalable approach to humanitarian assistance, building affected communities' much-needed resilience and health security.

Third Place

A Comprehensive Multi-Phase Intervention Addressing Iron Deficiency Anemia (IDA) in Pregnant Women in Yemen

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Iron Deficiency Anemia (IDA) is a leading cause of maternal mortality, disproportionately affecting pregnant women in low-resource settings. In Yemen, 40% of pregnant women suffer from anemia, causing increased maternal deaths, preterm birth, and impaired fetal development. With a maternal mortality ratio of 164 per 100,000 births, addressing IDA is critical to improving maternal and neonatal outcomes. However, Yemen's ongoing conflict, food insecurity, and limited healthcare infrastructure create additional barriers. This proposal introduces a phased, cost-effective intervention that integrates treatment, prevention, and education, aligning with Médecins Sans Frontières' (MSF) mobile healthcare model and proven global strategies. The first phase of intervention focuses on immediate treatment through mobile nutrition clinics, modeled after MSF's crisis-response units. These solar-powered mobile clinics, stationed in high-prevalence areas such as Hodeida, Taiz, and Sana'a, will provide low-cost hemoglobin screening, prenatal monitoring, and iron-folic acid supplementation. A trained network of community health workers (CHWs) will conduct door-to-door anemia screenings and distribute iron supplements, ensuring accessibility in remote areas. Additionally, a biannual deworming program, modeled after Vietnam's national strategy, will reduce anemia caused by parasitic infections, which account for up to 30% of IDA cases. To prevent maternal deaths from anemia-related complications, an emergency transport system will transfer high-risk pregnancies to community health facilities. Long-term prevention strategies will reduce reliance on supplementation. An iron-fortified water initiative, inspired by programs in Kenya and India, will involve dissolving ascorbic acid iron supplements into communal water sources, ensuring consistent iron intake. Additionally, Yemen-specific iron ingots will be introduced, modeled after Cambodia's Iron Fish program. These reusable cooking tools, designed in the form of a date palm, infuse iron into meals, reducing anemia prevalence by up to 50% over five years. Both strategies are low-cost and scalable, minimizing recurring expenses. Education is critical for sustained prevention. A school-based anemia awareness campaign, modeled after India's Rani Project, will educate adolescent girls on nutritional literacy, menstrual health, and IDA prevention, reducing future maternal anemia cases. CHWs will lead community nutrition workshops on iron-rich diets and supplement adherence, ensuring culturally appropriate outreach. This intervention will be implemented in four phases over three years: stakeholder engagement, a pilot program, full-scale expansion, and long-term monitoring. Tracking of anemia-related pregnancy complications and hemoglobin testing of pregnant women visiting mobile clinics are outcome measures to monitor reductions in maternal IDA rates and mortality. Cost estimates include USD \$2,500/day per mobile clinic, \$10 per household per year for fortified water, and \$5 per person biannually for deworming and hygiene kits. Funding will be sought through MSF, the Bill & Melinda Gates Foundation, and local partnerships. For long-term sustainability, MSF will train local NGOs and health officials to take over clinic operations post-intervention. Risk mitigation strategies include partnering with

religious leaders to increase supplement adherence and establishing alternative distribution networks in case of conflict-related disruptions. This plan integrates a community-driven model, aligning with MSF's expertise in maternal health crises. By combining treatment, prevention, and education, it offers a scalable, cost-effective solution to maternal IDA in Yemen, ensuring sustainable impacts.

Conflicts of Interest

The authors declare that they have no conflict of interests.

Authors' Contributions

AS: Served as the outreach team coordinator and master of ceremonies, served on the planning committee of the case competition, and gave final approval of the version to be published.

JC: Served as the research team coordinator, drafted the competition packages, served on the planning committee of the case competition, and gave final approval of the version to be published.

AE: Served as the financial and logistics team coordinator, drafted the case competition abstract booklet, served on the planning committee of the case competition, and gave final approval of the version to be published.

SS: Served on the planning committee of the case competition and gave final approval of the version to be published.

TH: Served on the planning committee of the case competition and gave final approval of the version to be published.

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