TREATING HUNGER:
MEDICAL EXPERTISE, NUTRITIONAL SCIENCE, AND THE DEVELOPMENT OF TECHNICAL FOOD SOLUTIONS

By

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Abstract

This thesis traces the way hunger was transformed into a medical problem and humanitarian food relief mutated into medical treatment from the Second World War until contemporary times. I chart how the medicalization of hunger redefined the way hunger was managed, identifying the marked features of the medicalization of hunger and looking especially to the nutritional solutions employed in emergency contexts. Medical scrutiny into the starving body, the proliferation of medical categories, the design of specific and differentiated protocols of management, the integration of hunger with the care of other concurrent or aggravated medical conditions, and the view of food as medicine emerged in an expanded form starting with World War II and continue to endure today. A predominant medical lens urged the implementation of interventions guided by medical expertise and subjected to medical supervision, reconceptualizing hunger relief as treatment. Another focus of this thesis is upon the global networks of knowledge that underlie the medicalization of hunger. If professionals with a medical experience assumed prominence and continue to retain influence in nutrition, experts from all corners of the world with a range of backgrounds constitute the global assemblage of hunger research and responses. Finally, I underscore the increasing emphasis on children in scientific hunger studies and humanitarian nutrition programs.

With the scientific community coalescing around the view of hunger as disease, humanitarian responses to hunger became increasingly technocratic, favoring efficient and large-scale technically-engineered solutions devised with expert knowledge. I show the persistent allure of simple, fast-acting concoctions of high-yielding medical and nutritional efficacy in humanitarian nutrition. The predominance of technically-engineered solutions in humanitarian nutrition speaks both to an established reliance on medico-scientific knowledge and the prioritization of expedient responses in the face of the need for immediate action. Employing a historical lens, I challenge straightforward accounts anchored in medico-scientific knowledge that exalt the novelty and adequacy of technically-engineered solutions to hunger. I grapple with the implications of a predominant medical frame to argue that managing hunger in emergency contexts should not be incompatible with politically-mindful, people-centered approaches integrated in local realities.

Keywords: hunger; medicalization; humanitarian aid; humanitarian nutrition; global nutrition knowledge; technical nutritional solutions.

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Acknowledgements

I dedicate this thesis to my parents, who have sacrificed little and large to grant me the opportunity to pursue graduate studies at Queen's University. More than providing material support, they offered me solid ground as I navigated the agitated waters of graduate life. Coming from a family of biologists, biochemists and neuroscientists, my interest was bound to be connected to the scientific realm. In our many conversations over the topic, I saw their difficulty in grappling with how scientific knowledge is not a primary pillar for devising solutions to hunger. This could not reflect better the struggles of the nutrition community to think beyond the purview of its scientific boundaries. This thesis is an effort to broaden our lenses for viewing and responding to hunger, so that we can envision the importance of building avenues of dialogue between experts from different areas and, most importantly, that meaningfully connect with those afflicted by hunger.

This project was challenging in many ways. It was ambitious, seeming too broad and unwieldy at times, but also too limited given the imperative for different nutritional approaches in humanitarian contexts and beyond. It was hard to attain to critiques and analyses, when millions face immediate needs. It sometimes seemed abstract with my lack of humanitarian experience on the ground. Above all, it was distressing to grapple with a subject that is painfully real, while I conducted the research from the comfortable confines of my food-secure reality. For all the subject's vastness and for the immense transformative potential that has yet to be explored in politically-mindful and socio-culturally inclusive responses to hunger, I hope to have highlighted the problematics of the medicalization of hunger and underscored this relevant though under-researched arena.

This thesis would not have been possible without the relentless support of my supervisor, Dr. Rebecca Manley. I sincerely thank her unwavering patience, encouragement, and ever so gracious manner of providing feedback, provoking reflections, and pushing my analytical capability. I owe it to her for turning this research journey into such a stimulating, gratifying and fruitful learning experience. I also thank Dr. Jenna Healey for the valuable inputs on framing my thesis and on envisioning the place of this

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study within the realms of medicine, science, and technology. This thesis would never have reached its final form without the help of remarkable friends, who kindly listened to the manifold struggles I encountered along the way, provided comforting encouragement, and fomented invaluable reflections. The following pages carry in big and small ways the imprints of all who have mentored me in my recent and longer past. Reflecting their lessons in this project is one of my ways of expressing gratitude.

As I was writing this thesis, my conviction of food's centrality to social and cultural life only grew. When learning about the technical solutions used in the management of hunger, most of them unpalatable or lacking socio-cultural specificity, I kept being reminded of the pleasures that fresh, local food and home recipes bring us. Food anchors memories and sensations. It builds relationships. It is so much more than an assemblage of nutrients or a kind of medicine. It can be an instrument of power, but also a tool for social change. May we always be inspired by food's heterogeneity and aim to integrate its constructive potential when responding to hunger.

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List of Abbreviations

COBSRA – Council of British Societies for Relief Abroad

FAO – Food and Agriculture Organization

MSF – Médecins Sans Frontières/Doctors Without Borders

MUAC – Mid-Upper-Arm-Circumference

OCHA – United Nation's Office for the Coordination of Humanitarian Affairs

PAG – Protein Advisory Group

RUTF – Ready-to-Use Therapeutic Food

UNICEF – United Nations Children's Fund

UNRRA – United Nation's Relief and Rehabilitation Agency

WHO – World Health Organization

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Chapter 1

Introduction

Hunger is elusive, yet painstakingly real; it is subjective, yet a collective experience; it breeds some of the greatest stories of tragedy, yet it also engenders stories of resilience; it speaks to nutritional needs, yet it can never be reduced to physiological processes. This thesis is animated by these complexities and uncovers its own kaleidoscopic story of contentions, continuities, disjuncture, and overlapping nutritional paradigms and practices. It charts the way hunger was transformed into a medical problem and hunger relief mutated into medical treatment from the Second World War until contemporary times. I probe the appeal and the implications of a predominantly medical and scientific framework and how it facilitates the development and use of specific humanitarian technologies of hunger relief. In this way, this study has a dual focus: it looks both to the insertion of hunger in a medical frame and to how this shapes the nutritional solutions employed in emergency contexts.

Starting in the Second World War, starvation moved to the center of medical attention, hunger was pathologized in an expanded manner, and the search for medicalized solutions to hunger commenced.[1] World War II was also a moment when the centralized, bureaucratic, science-centered, and expert-reliant features of humanitarian aid culminated and increasingly expanded.[2] The widespread promotion and recognition

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[1] On the pathologization of hunger, see: Dana Simmons, "Starvation Science: From Colonies to Metropole," in *Food and Globalization: Consumption Markets and Politics in the Modern World*, eds. Alexander Nutzenadel and Frank Trentmann (New York: Berg, 2008), 173, 181, 186.
[2] Michael Barnett, *Empire of Humanity: A History of Humanitarianism* (Ithaca: Cornell University Press, 2011) 105, 130.

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of science as conducive to social development solidified in the post-World War II era. Scientific expertise became central to defining, planning and managing social problems, and selecting those that merited attention.[3] The postwar further ushered a narrower model of hunger relief oriented by nutritional science and standardized conceptions of hunger, which focused on resolving nutritional inadequacies and on expediting a technical form of relief.[4] Along the course of the twentieth century, hunger has been increasingly viewed through a reductive biological prism, which makes it suited for nutrient-focused, technical and medical solutions that seek to dictate behavior norms through feeding programs.[5]

It is in this context that simplified, fast acting, and technically-engineered nutritional concoctions gained a special appeal in the management of hunger alongside a predominant medical framework. In the immediate post-World War II era, this came in the form of protein hydrolysates, which were solutions of pre-digested proteins administered orally, intravenously or via a nasogastric tube.[6] The 1960s ushered the development of high-protein food mixtures, some of them being nothing more than an assembly of pulse or nut flours, milk powder and added vitamins and minerals, while

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[3] On the rise and primacy of science in the modern socio-political life, see: Steven Shapin, *Never Pure: Historical Studies of Science as if it was Produced by People with Bodies, Situated in Time, Space, Culture, and Society, and Struggling for Credibility and Authority* (Baltimore: Johns Hopkins University Press, 2010), 11-12, 377-392. See also, Evan Schofer, "Science Associations in the International Sphere, 1875-1990: The Rationalization of Science and the Scientization of Society," In *Constructing World Culture: International Nongovernmental Organizations since 1875*, edited by John Boli and George M. Thomas (Stanford: Stanford University Press, 1999), 252-254; 257-258, 264-265.

[4] James Vernon, *Hunger: A Modern History* (Cambridge: Belknap Press of Harvard University Press, 2007), 117, 157; Jenny Leigh Smith, "The Awkward Years: Defining and Managing Famines, 1944–1947," *History and Technology* 31, no. 3 (2015): 206-208.

[5] Susanne Jaspars, Tom Scott-Smith, and Elizabeth Hull, eds, *Contested Evolution of Nutrition for Humanitarian and Development Ends: Report of an International Workshop* (University of Oxford, October 2018), 1.

[6] K. V. Krishnan, E. K. Narayanan, and G. Sankaran, "Protein Hydrolysates in the Treatment of Inanition," *The Indian Medical Gazette* 79, no. 4 (1944): 160-163.

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others assumed heightened scientific and artificial contours, such as the case of the extraction of protein from leaves that could be produced into leaf powder and even biscuits.[7] The late 1990s centered the spotlight of nutritional responses onto ready-to-use foods, which, as the name suggests, are "designed to be eaten straight from the packet." Ready-to-use foods have given way to a variety of products that may be categorized as therapeutic, supplementary or complementary, appropriate to specific degrees of malnutrition.[8]

This thesis hopes to encourage studies that cross disciplinary bounds in the as yet limited scholarship on the medicalization of hunger and the responses designed amidst a medico-scientific paradigm. A historical perspective complicates the predominant rhetoric that portrays techno-scientific nutritional solutions as unique and novel by allowing us to situate and comprehend humanitarian technologies within a longer line of continuities, failures and disputes. It also provides a complex picture of the intertwined and contested nature of scientific and socio-cultural approaches to view and govern hunger. Finally, it allows us to see the intimate connections between nutritional scientists, the food industry, and humanitarian endeavors. Critiquing the medicalization of hunger does not preclude an acknowledgment that medical and scientific knowledge have contributed to improvements and expanded the reach of solutions in the management of hunger. However, the predominance of a medical frame has fostered troubling trends that

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[7] The Indian Multipurpose Food, Formula C, for example, constituted in a "mixture of low fat groundnut flour, (60 parts), Bengal gram *dhal* (20 parts) and skim milk powder (20 parts) and fortified with calcium and vitamins." V. Subrahmanyan et al., "Treatment of Nutritional Oedema Syndrome (Kwashiorkor) With a Low Cost Protein Food," *Indian Journal of Pediatrics* 24, no. 4 (1957): 112-114.
On leaf protein food: N.W. Pirie, "World Hunger as a Biochemical Problem," *Journal of the Royal Society of Arts* 106, no. 5023 (1958): 518, 523-524, 528.

[8] Philip James, "Products Are Not Enough: Putting Nutrition Products in Their Proper Place in the Treatment and Prevention of Global Acute Malnutrition," Action Contre la Faim International, December 2011, quote on 7, also, 5-10.

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need to be highlighted and discussed to a greater extent. In localizing the problem in the body, the broader structural causes of hunger and socio-cultural meanings of food are more easily obscured, favoring technical solutions that emphasize immediate, efficient and effective medical and nutritional results. The primacy of scientific criteria further fails to grasp the subjective dimensions of hunger. The focus upon these characteristics has also propelled industrially-produced foods that are nutritionally designed and precise, often in disregard of local realities.[9] This thesis is inserted amid critiques of a reductive biochemical view of nutrition, narrow medical understanding of hunger, and the technocratic architecture of humanitarianism. It aims to complicate straightforward accounts of scientific ingenuity, technological promise and the extraordinary curative aura of technical solutions to hunger. In this way, I contribute to instigating a debate that will hopefully envision responses mindful of the larger politico-economic causes of hunger, socio-culturally sensitive approaches and the subjective aspect of hunger.

1.1 Literature Review

To engage in humanitarian nutrition studies is inherently to straddle disciplinary borders that encompass histories of hunger, anthropologies of medicine and food, nutritional science, and the politics of humanitarianism. This thesis is mainly inserted at the historical intersections of hunger, humanitarianism and nutrition. Historical inquiries of hunger constitute a field mostly fragmented along epoch, geographic, and thematic lines, though many works situate or relate their topics to the broader international arena.

[9] These aspects were well discussed in the recent international workshop organized by the Food Studies Centre at the University of London, and the Refugee Studies Centre at the Oxford University: Jaspars, Scott-Smith, and Hull, *Contested Evolution of Nutrition for Humanitarian and Development Ends*. They are also discussed in Scott-Smith's works, especially: Tom Scott-Smith, "Defining Hunger, Redefining Food: Humanitarianism in the Twentieth Century" (PhD diss., University of Oxford, 2014).

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They have shown the changing and different social conceptions of hunger and remarked the political nature of hunger crisis.[10] This study is also informed by histories of nutrition, both those that trace the developments of nutrition science and those cognizant of nutrition's politico-economic facets and social-cultural grounding.[11]

In looking to international organizations and the broader architecture of health they shape, my historical narrative is also inserted amid the field of global health.[12] More specifically, the story I thread finds resonance with the continuous trends historian Randall Packard has outlined as characterizing a twentieth century history of global health. Health interventions in the Global South, much like medicalized solutions to hunger, have been mainly detached from local realities and lacking participatory mechanisms that include local actors and value local knowledge. In general, these interventions have narrowly focused on employing biomedical technologies, usually prompted by contexts of crisis that demanded easily applicable and fast acting solutions

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[10] Vernon's *Hunger: A Modern History* encompasses a broader perspective, though his study is still centered on Britain. Some prominent examples of histories of hunger include: Alice Weinreb, *Modern Hungers: Food and Power in Twentieth-Century Germany* (New York: Oxford University Press, 2017); Amartya Sen, *Poverty and Famines: An Essay on Entitlement and Deprivation* (Oxford: Oxford University Press, 1981); Cormac Ó Gráda, *Famine: A Short History* (Princeton: Princeton University Press, 2009); Mike Davis, *Late Victorian Holocausts: El Niño Famines and the Making of the Third World* (London: Verso, 2001); Nicholas Ganson, *The Soviet Famine of 1946–47 in Global and Historical Perspective* (New York: Palgrave Macmillan, 2009).

[11] Some examples of histories of nutrition include: E. V. McCollum, *A History of Nutrition: The Sequence of Ideas in Nutrition Investigations* (Boston: Houghton Mifflin Company, 1957); Harmke Kamminga and Andrew Cunningham, eds, *The Science and Culture of Nutrition, 1840–1940* (Amsterdam: Editions Rodopi, 1995); Kenneth Carpenter, *Protein and Energy: A Study of Changing Ideas in Nutrition* (New York: Cambridge University Press, 1994); Kenneth Carpenter, "A Short History of Nutritional Science," *The Journal of Nutrition* 133, no. 3 (2003): 638–645, 133, no. 4 (2003): 975–984, 133, no. 10 (2003): 3023–3032, and 133, no. 11 (2003): 3331–3342.

[12] Some examples of studies that undertake a social history of medicine and help us envision the architecture of global health are: David Arnold, *Science, Technology and Medicine in Colonial India* (Cambridge: Cambridge University Press, 2000); Randall, M. Packard, *The Making of a Tropical Disease: A Short History of Malaria* (Baltimore: Johns Hopkins University Press, 2007); Rohan Deb Roy, *Malarial Subjects: Empire, Medicine and Nonhumans in British India 1820-1909* (Cambridge: Cambridge University Press, 2017); Sunil S. Amrith, "Health in India Since Independence," Working Paper 79. Manchester: Brooks World Poverty Institute, 2009.

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effective on a large-scale. Similar to nutritional experts' lionization of medico-scientific knowledge and solutions, a confidence on the power of Western medical expertise and technologies have bolstered health interventions. Finally, akin to medicalization's neglect of the larger structural causes of hunger, health interventions' emphasis on a disease-focused approach within a short-term remit has mostly failed to grapple with structural deficiencies that pervade the social determinants of health and sidelined capacity and infrastructure-building responses.[13]

There is still little scholarship that links studies of science with relief, explores the place of objects in humanitarianism and envisions the socio-political, scientific and material character of humanitarian nutrition. Academic research on humanitarianism tends to focus on moral precepts, institutional politics and political developments surrounding humanitarian action.[14] An interest for investigating the historical thread of a humanitarian sentiment has also garnered much scholarly attention.[15] Prolific in the scholarship are mostly localized, theme- or time-specific studies on humanitarianism.[16]

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[13] Randall M. Packard, *A History of Global Health: Interventions Into the Lives of Other Peoples* (Baltimore: Johns Hopkins University Press, 2016), 6, 8-9, 14.
[14] Tom Scott-Smith, "Defining Hunger, Redefining Food," 22, 29-32; Tom Scott-Smith, "Sticky Technologies: Plumpy'nut®, Emergency Feeding and the Viscosity of Humanitarian Design," *Social Studies of Science* 48, no. 1 (2018): 4.
[15] Some landmark studies and more recent examples include: Thomas W. Laqueur, "Bodies, Details, and the Humanitarian Narrative," in *The New Cultural History*, ed. Lynn Hunt, 176-204 (Berkeley: University of California Press, 1989): 176-177, 197; Thomas L. Haskell, "Capitalism and the Origins of the Humanitarian Sensibility," *American Historical Review* 90, no. 2 (1985): 339–361, and 90 no. 3 (1985): 547–566; Erica Bornstein and Peter Redfield, eds., *Forces of Compassion: Humanitarianism Between Ethics and Politics* (Santa Fe: School for Advanced Research Press, 2011); Richard A. Wilson and Richard D. Brown, eds., *Humanitarianism and Suffering: The Mobilization of Empathy* (Cambridge: Cambridge University Press, 2009); Samuel Moyn, "Empathy in History, Empathizing with Humanity," *History and Theory* 45, no. 3 (2006): 397-415.
[16] Some examples include: Alan Lester and Fae Dussart, *Colonization and the Origins of Humanitarian Governance: Protecting Aborigines Across the Nineteenth-Century British Empire* (Cambridge: Cambridge University Press, 2014); Brendan Simms and D.J.B Trim., eds, *Humanitarian Intervention: A History* (Cambridge: Cambridge University Press, 2011); Bruno Cabanes, *The Great War and the Origins of Humanitarianism, 1918–1924* (Cambridge: Cambridge University Press, 2014); Keith David Watenpaugh, *Bread from Stones: The Middle East and the Making of Modern Humanitarianism* (Oakland: University of

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Nonetheless, recent works have begun to place local studies of humanitarianism within the larger international arena. Further, the field on longer histories of humanitarianism is currently being energized.[17] Also animating is the work of some scholars, such as Peter Redfield and Tom Scott-Smith, which have been connecting the fields of science and relief with a specific focus on humanitarian products.[18]

The limited historiography on the medicalization of hunger requires a multidisciplinary approach. There are fruitful, if sparse, historical, anthropological, and social science studies in thematic areas that range from science, medicine, nutrition, food, and humanitarianism. Historian Dana Simmons has analyzed the mutation of hunger into a disease during World War II, marked by "a flood of medical publications" on hunger studies that were then being conducted beyond the colonies to the metropole.[19] Lock and Nguyen have examined how the use of biological indexes for determining malnutrition forged the "biological standardization of hunger," which instigated the medicalization of hunger. They traced how the conception and management of the body came to be systematized and science-based from the seventeenth century, while charting the biological standardization of hunger starting in the interwar. Exploring both the

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California Press, 2015); Michael Barnett, and Thomas G. Weiss (eds), *Humanitarianism in Question: Politics, Power, Ethics* (Ithaca: Cornell University Press, 2008).

[17] Silvia Salvatici will launch *A History of Humanitarianism: In the name of Others* on June of 2019, which traces international humanitarianism from the anti-slavery movement of the eighteenth century up until the end of the Cold War. Silvia Salvatici, *A History of Humanitarianism, 1755-1989: In the Name of Others* (Manchester: Manchester University Press, 2019). Tom Scott-Smith's upcoming book has traced the history of humanitarian nutrition from the late eighteenth century to the 2000s, looking not just to a history of emergency foods but also remarking changes and features of humanitarianism. Tom Scott-Smith, "Defining Hunger, Redefining Food: Humanitarianism in the Twentieth Century" (PhD diss., University of Oxford, 2014).

[18] Peter Redfield, "Bioexpectations: Life Technologies as Humanitarian Goods," *Public Culture* 24, no. 166 (2012): 157–184; Scott-Smith, "Sticky Technologies"; Tom Scott-Smith, "The Fetishism of Humanitarian Objects and the Management of Malnutrition in Emergencies," *Third World Quarterly* 34, no. 5 (2013): 913–928.

[19] Simmons, "Starvation Science," quote on 181, also, 186-187.

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biomedicalization of hunger and of nutrition, they discussed how a biological standardization of hunger fostered the use of biomedical technologies, capitalized upon by the industry.[20] Some authors have studied the medicalization of hunger in specific contexts. Nancy Scheper-Hughes, for example, wrote a medical anthropology on the medicalization of hunger in Pernambuco, Brazil, in the 1980s. She sharply discussed how hunger's transformation into a disease - *nervoso* or nervous sickness - individualized and medicalized responses, concealing the social and politically destabilizing facets of hunger.[21] Even more scarce is a literature that looks at how the medicalization of hunger alters responses and shapes specific approaches to manage hunger.[22] Comprehensive and in depth analyses of the implications of the medicalization of hunger are few and scattered. Further, scholars working with histories of food, medicine and science have acknowledged the limited historical literature on food as medicine.[23]

Scott-Smith's forthcoming publishing of his PhD dissertation on humanitarian nutrition stands as a notable exception and breaks ground by joining unconnected areas of research: the anthropology of aid, the materiality of humanitarianism, and the history of humanitarian nutrition.[24] Scott-Smith thoroughly traced the medicalization of hunger during and after the Second World War, specifically looking at how chemical and biomedical investigations fostered a biochemical view of hunger, with a focus on detailed

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[20] Margaret Lock and Vinh-Kim Nguyen, *An Anthropology of Biomedicine* (Oxford: Wiley-Blackwell Publishing, 2010), 11, 148, 163-168.
[21] Nancy Scheper-Hughes, *Death Without Weeping: The Violence of Everyday Life in Brazil* (Berkeley: University of California Press, 1992), 169-170.
[22] The scholarship somewhat acknowledges the technical contours that a medicalized approach to hunger entails, as the above example of Lock and Nguyen's work shows. Jenny Edkins also discusses how the medicalization of hunger illustrates "the modern impulse to technologize."
Jenny Edkins, *Whose Hunger? Concepts of Famine, Practices of Aid* (Minneapolis: University of Minnesota Press, 2000), quote on 25, also 26-27.
[23] Juliana Adelman, and Lisa Haushofer, "Introduction: Food as Medicine, Medicine as Food," *Journal of the History of Medicine and Allied Sciences* 73, no. 2 (2018): 129.
[24] Scott-Smith, "Defining Hunger, Redefining Food," 25.

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internal analyses and the differentiation of hunger into multiple conditions. His analysis was especially insightful by both recognizing the stirrings of the medicalization of hunger, and discussing how it produced technocratic responses and obscured the political roots of hunger. This served as a springboard to his central argument regarding how the medicalization of hunger enabled the rise and establishment of nutritional anthropometry.[25]

This study, in many ways, follows alongside Scott-Smith's project of shedding a historical light on humanitarian nutrition, emphasizing the technical character of solutions to hunger and pointing out the implications of a reductive vision in the solutions to hunger and designs of modern humanitarianism. However, this thesis is distinctive in its attempt to unravel the specific manifestations of the medicalization of hunger not just in its post-war effervescence but until the 2000s. Whereas Scott-Smith looked especially at the materiality of humanitarian nutrition, I have focused my lens on how a medical frame reshaped the very nature of relief into *treatment*. Further, I underscore the singularity of the child amid the medicalization of hunger, which fostered specific medical categories, differential schemes of care, and increasingly specialized foods to meet children's particular debilities, and organized the management of childhood malnutrition around a technocratic assemblage of humanitarian nutrition. Finally, I bring more attention to the expertise that underlies the medicalization of hunger and the constitutive role of global networks of knowledge, which I draw out in more detail in the section below.

[25] Scott-Smith, "Defining Hunger, Redefining Food," 41, 243-245, 247-249, 330.

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1.2 Theoretical Framework and Guiding Assumptions

The global history perspective acts as a guiding framework in this study. Though this thesis does not engage in detail with the structural transformations that gave rise and sustained the medicalization of hunger, it highlights how the global knowledge exchange and interaction of humanitarian nutrition practices have been central to shaping political, economic, social and cultural change, and were themselves products of these factors on a global scale.[26] I consider that sustained global interactions generated social change in the conceptualization and management of hunger, at the same time that the flows of knowledge and nutrition practices developed through these co-constitutive interactions.[27] A global history approach also stresses the importance of recognizing the hierarchies of power among global interactions and arrangements.[28] This becomes especially important in face of the contemporary trend in world politics where a greater plurality has not materialized in more democratic international mechanisms.[29] Having global history as a lens means incorporating the frames of international and transnational history, while going beyond a concern for cross-national movements or considering only the debates around the intergovernmental arena.[30] I thus take global integration as a context that enabled exchanges which, in turn, fostered important intellectual and social change.[31]

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[26] Here, I use the conception of global history as outlined by Conrad in the first study to comprehensively systematize and delineate the genealogy, methodology and distinctiveness of global history: Sebastian Conrad, *What is Global History?* (Princeton: Princeton University Press, 2016), 64-65, 68, 92.
[27] Ibid, 65, 101.
[28] Ibid, 70-71, 230.
[29] Matthew Connelly, "AHR Conversation: On Transnational History," *The American Historical Review* 111, no. 5 (2006): 1461.
[30] Akira Iriye, "The Rise of Global and Transnational History," in *Global and Transnational History: The Past, Present, and Future* (New York: Palgrave Macmillan, 2013), 15.
[31] Conrad, *What is Global History?* 92, 101. Here, I understand the transnational history frame to be "an approach to history that focuses on a whole range of connections that transcend politically bounded territories and connect various parts of the world to one another. Networks, institutions, ideas, and processes constitute these connections." Sven Beckert, "AHR Conversation: On Transnational History,"

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While global history orients the outlook in this thesis, my aim was not to outline a global history of the medicalization of hunger. I acknowledge the existence and influence of changing global structures in the process of the medicalization of hunger and humanitarianism's technocratic constitution. From its inception, the medicalization of hunger had a global character. Research and hunger relief in World War II developed in multiple sites and a diversity of experiences and expertise gave life to this emerging field.[32] The international structure of the post-World War II era also fostered the medicalization of hunger, with hunger acquiring global dimensions beyond its previous mainly imperial or European bounds through newly-founded international organizations, and a surge of academic interest and public awareness dedicated to the topic.[33] Therefore, alongside the design of the international system, expertise on nutrition and more specifically on hunger was constituted globally and around a global field of action. The predominant frameworks that orient the conceptualizations and ways to manage hunger are a product of larger socio-political structures.[34] Beyond a sole emphasis on scientific ingenuity, I am cognizant and attempt to grapple where appropriate with the global interactions and structures, along with the flows of knowledge that shape the conceptualization and management of hunger.

1446. Also, as scholar Akira Iriye has noted, the convergence of international and transnational affairs benefits from a view of some cases with the use of both of these frameworks. Iriye, "The Rise of Global and Transnational History," 16.

[32] Vernon has shown how nutritional science was produced transnationally and embedded in transnational networks of expertise. I envision nutrition knowledge as co-constituted amid the diverse sites that produce and contest it, thus adopting a broader framework than Vernon. Vernon, *Hunger*, 8, 105, 111.

[33] David Grigg, *The World Food Problem* (Oxford: Blackwell, 1993), 1-3.

[34] Tom Scott-Smith, "On an Empty Stomach: Humanitarian Approaches to Hunger," in *Contested Evolution of Nutrition for Humanitarian and Development Ends: Report of an International Workshop*, eds. Susanne Jaspars, Tom Scott-Smith, and Elizabeth Hull (University of Oxford, October 2018), 3.

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This study employs a historical lens that is socio-culturally sensitive in its understanding of concepts. I take food and medicine as mutable constructions and their relationship as historically contingent.[35] More specifically, the relationship between food and medicine is shaped by intellectual interactions, material configurations, and the exchanges across different spaces.[36] I adopt Vernon's position that beyond its materiality, hunger carries a historical and cultural specificity across time. By centering hunger, we are able to envision the network of actors, knowledge and authority that surround attempts to conceptualize and manage hunger.[37] The shift toward more technical nutritional solutions and humanitarian products speaks to a view of hunger as a failure of natural ecosystems or malfunction of politico-economic structures rather than a problem within them, which calls for expert-devised technologized responses removed from the political contexts of hunger.[38] I therefore understand technologized responses to hunger as Jenny Edkins defined it: "a response that claims to rely on a theoretical framework and a set of rules, practices or techniques […] deemed to be applicable in a series of different historical and geographical locations."[39] It is this conviction in uniformity, neutrality and a universal remit, coupled with a faith in scientific expertise, that underlie technical solutions to hunger.

A few caveats help to clarify other underlying orientations and stylistic choices I adopted in this project. I take medicalization as a "process by which nonmedical problems become defined and treated as medical problems, usually in terms of illness and

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[35] Juliana Adelman, and Lisa Haushofer, "Introduction: Food as Medicine, Medicine as Food," *Journal of the History of Medicine and Allied Sciences* 73, no. 2 (2018): 129.
[36] Ibid, 133.
[37] Vernon, *Hunger*, 8.
[38] Jenny Edkins, "Mass Starvations and the Limitations of Famine Theorising," *IDS Bulletin* 33, no. 4 (2002): 13.
[39] Ibid, 14.

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disorders."[40] To medicalize is to decontextualize human conditions from their socio-cultural, historical and political environs and to classify bodily expressions in accordance with the "sterile" realm of medicine, guided by standardized techniques.[41] Over the last century, the phenomenon whereby social experiences are medicalized has escalated through a rise and expansion in medical categories, authority, and diagnoses. In reducing the problem to biological or physiological causes, medicalization favors medical interventions at the individual level instead of broader social responses aimed at the collective body.[42]

This thesis will follow the Western path of humanitarianism, since it has largely delineated the contemporary humanitarian system's knowledge and practical design.[43] Defining humanitarian aid is a daunting task, not least given its blurring with other fields, such as development projects, military interventions, and human rights.[44] Even emblematic humanitarian organizations such as the International Committee of the Red Cross conceive of humanitarian aid in a broader way than solely the acute remit.[45] Though in reality the boundaries of humanitarian action can never be so neatly delimited,

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[40] Peter Conrad, *The Medicalization of Society: On the Transformation of Human Conditions into Treatable Disorders* (Baltimore: Johns Hopkins University Press, 2007), 4.
[41] Lock and Nguyen, *An Anthropology of Biomedicine*, 68, 78.
[42] Conrad, *The Medicalization of Society*, 7-8, 118, 121, 132, 148-152.
[43] However, it is important to acknowledge the diversity of humanitarian experiences beyond North America and Europe. Eleanor Davey, John Borton, and Matthew Foley, *A History of the Humanitarian System: Western Origins and Foundations*, Humanitarian Policy Group Working Paper (London: Overseas Development Institute, June 2013), 36.
[44] Joanna Macrae, ed., "The New Humanitarianisms: A Review of Trends in Global Humanitarian Action," Humanitarian Policy Group Report 11, Overseas Development Institute, 2002, 5-6, 10.
[45] The British organization Development Initiatives remarked that the following definition permeates the principles of the International Red Cross, UN resolutions and humanitarian guidelines: "[the purpose to] save lives, alleviate suffering and maintain human dignity during and after man-made crises and disasters caused by natural hazards, as well as to prevent and strengthen preparedness for when such situations occur." Development Initiatives, "Defining Humanitarian Assistance," accessed March 22, 2019, http://devinit.org/defining-humanitarian-assistance/#. See also: Red Cross EU Office, "Humanitarian Aid," accessed March 22, 2019, https://redcross.eu/themes/humanitarian-aid.

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it is important to acknowledge that the core of humanitarian action entails emergency relief that provides life-saving basic essentials, such as water, food, shelter and medical assistance in situations of acute distress. This short-term character shapes specific kinds of practices and responses and it is upon this understanding and its consequences that I conducted my analyses. Lastly, I use hunger and malnutrition interchangeably to mean a lack of adequate nourishment, even though I am cognizant of their distinct scientific meanings.[46] Aside from stylistic reasons, this choice stems from my desire to show that scientific specificity should not elide the broader experience captured by the idea of hunger.

1.3 Sources

This study, using a historical lens coupled with an interdisciplinary approach, seeks to integrate sources from the humanities, social sciences, medical and nutritional sciences. It draws heavily on articles published in medical and nutrition journals to investigate which conceptions and ways to manage hunger were prevalent among the scientific community. I have focused on Western journals, such as *The Lancet*, *British Medical Journal*, *Nutrition Reviews*, *Food and Nutrition Bulletin*, and proceedings of medical and nutritional societies, given their established eminence and wide reach among the international scientific community. Looking to these journals does not mean I have restricted the views presented to those of researchers of Western developed countries. In fact, the geographically-diverse nature of expertise that permeated the pages of Western journals reflects the global character of medical and nutritional knowledge. Western

[46] I bring some clarifications on the use of these terms in the brief historical outline section below and in the chapters of the thesis, as I explore the medical concepts surrounding hunger.

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journals allow us to observe the experts that engaged in discussions of hunger and remark the participation of professionals from the Global South as well as to glean at how Western scientists were attentive to the kind of work conducted in journals from developing countries.

I also look at guidelines and protocols issued by international organizations, especially the World Health Organization, as I delve into the underlying framework that upheld views on hunger and proposed practices for its relief. International organizations exert significant influence in disseminating and applying frameworks, techniques, and responses in nutrition issues. In this sense, they offer fruitful spaces for analyzing the conceptions and guidelines the international community generally coalesced around and for reflecting upon the networks of knowledge that informed scientific opinion on hunger. The World Health Organization (WHO) is illuminative in demonstrating the view of hunger as disease, its integration within medical protocols of management, and the specific techniques and solutions for treatment.

Reports from humanitarian actors, in the form of diaries, relief accounts and scientific studies, also color the following pages with on the ground experience. The publications of Médecins Sans Frontières (MSF) constitute an important pillar for the story I craft in Chapter 3. I chose MSF given its central role in the international advocacy for the application of ready-to-use therapeutic foods (RUTFs) following the organization's mass deployment of Plumpy'Nut® during the 2005 Niger famine. Moreover, MSF occupies a prominent place in the humanitarian system, both for its large

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and robust structure, and influence over humanitarian and global health issues.[47] While I am cognizant that MSF is a medical organization by its very nature, a plurality of types of expertise exist within the organization and offer a contentious arena for debates.[48] In many ways, therefore, MSF can be seen as a microcosm of the broader discussions that took place in the international arena and scientific circles in illustrating the coexisting frameworks for viewing hunger at the same time that a medical frame was fundamental in guiding responses. Finally, MSF's mandate of action largely centered around times of emergency helps to reveal broader trends about the architecture of humanitarianism.[49]

1.4 Charting a Brief History of Humanitarianism, Nutrition, and Hunger

The analytical core of this thesis starts off in the post-World War II era, when the medicalization of hunger took shape in an expanded manner and humanitarianism increasingly assumed the technocratic contours that constitute it today. However, in order to situate this particular framework and relief designs, I will outline important historical developments up to the Second World War in humanitarianism, nutrition, and hunger to understand how this medical and technical architecture was assembled. Inserting the medicalization of hunger in a longer historical trajectory helps to envision the magnitude

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[47] In his detailed study of MSF's work, Peter Redfield has described MSF as a "transnational fixture not only in emergency relief efforts but also in a much wider array of global health concerns." Peter Redfield, "Doctors, Borders, and Life in Crisis." *Cultural Anthropology* 20, no. 3 (2005): 331

[48] See, for example, the contentions in the case of the Niger famine as described in: Jean-Hervé Jézéquel, "Staging a "Medical Coup"? Médecins Sans Frontières and the 2005 Food Crisis in Niger," in *Medical Humanitarianism: Ethnographies of Practice*, eds. Sharon Abramowitz and Catherine Panter-Brick (Philadelphia: University of Pennsylvania Press, 2015), 121-123, 129-130. Other examples of the contestations that permeate the organization can be found in: Claire Magone, Michael Neuman and Fabrice Weissman, eds., *Humanitarian Negotiations Revealed: The MSF Experience* (London: C. Hurst & Co, 2011).

[49] Peter Redfield, *Life in Crisis: The Ethical Journey of Doctors Without Borders* (Berkeley: University of California Press, 2013), 14-17.

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of change facilitated by a medical frame and the shifts in the ways hunger was conceptualized and humanitarian relief deployed to manage it.

Scholars have traced the existence of a humanitarian sentiment to the second half of the eighteenth century.[50] The anti-slavery movement starting at the end of the eighteenth century was the first moment humanitarianism became articulated in a global level.[51] In the late eighteenth and nineteenth centuries, a humanitarian reform sensibility arose in Western Europe and North America, meshing domestic with overseas philanthropic work in diverse areas such as slavery, poverty relief, and medical care, imparting a lasting religious dimension to humanitarian endeavors.[52] From the mid-nineteenth century onwards, an increased international cooperation in the fields of medicine, sanitation, and natural disaster responses functioned as institutional learning spaces of humanitarianism.[53] From its earliest expressions, humanitarianism also devoted special attention to the body. Laqueur's study is a milestone in acknowledging not only the centrality of the body for shaping humanitarian discourses and actions but also the integral role of medicine in effecting this connection. In Western societies, beginning in the late eighteenth century, medical reports imparted a scientific authority to meticulous inquiries upon living and dead bodies, conveying suffering and thus engendering a

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[50] Thomas W. Laqueur, "Bodies, Details, and the Humanitarian Narrative," in *The New Cultural History*, ed. Lynn Hunt, 176-204 (Berkeley: University of California Press, 1989): 176-177, 197; Scott-Smith, "Defining Hunger, Redefining Food," 13; Thomas L. Haskell, "Capitalism and the Origins of the Humanitarian Sensibility," *American Historical Review* 90, no. 2 (1985): 339–361, and 90 no. 3 (1985): 547–566.

[51] Johannes Paulmann, "The Dilemmas of Humanitarian Aid: Historical Perspectives," in *Dilemmas of Humanitarian Aid in the Twentieth Century*, ed. Johannes Paulmann (Oxford: Oxford University Press, 2016), 12.

[52] Johannes Paulmann, "Conjunctures in the History of International Humanitarian Aid during the Twentieth Century," *Humanity: An International Journal of Human Rights, Humanitarianism, and Development* 4, no. 2 (2013): 217.

[53] Davey, Borton, and Foley, *A History of the Humanitarian System*, 6.

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humanitarian narrative and interventions.[54] Recent literature on humanitarianism during the colonial era has also highlighted how a humanitarian discourse was anchored on the body.[55] The body, through scientific narrations, thus empowered a "shared locus of sympathy" and was intimately connected to humanitarian impetuses.[56]

Concomitantly to the development of humanitarian sentiment and activities in the era of empires, shifting views on hunger and the rise of nutritional science spanned the eighteenth to the late nineteenth centuries. Based on Adam Smith and Thomas Malthus' philosophies, the late eighteenth century initiated the prevalence of classical political economic views on hunger. The politico-economic and Malthusian rationale attributed hunger to a human causality, not mutually exclusive from a still extant providential belief. The solution was thought to only be found in the market's own balancing mechanisms.[57] The early nineteenth century remained dominated by neo-Malthusian views that imparted even greater emphasis on the need to stimulate industry among the hungry.[58] The 1840s were also an initial point in the development of nutritional science, by way of the scientific studies in chemical physiology, later maturing into biochemistry, that brought animal chemistry to assess nutritional efficiency.[59] Chemical studies

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[54] Laqueur, "Bodies, Details, and the Humanitarian Narrative," 177, 180, 182-185.
[55] McGowen identified that the abolitionist movement carried a humanitarian sensibility naturally attuned to suffering, which granted a humanitarian authority entitled to speak for and restitute the slaves' damaged body. Randall McGowen, "Power and Humanity, or Foucault Among the Historians," in *Reassessing Foucault: Power, Medicine and the Body,* edited by Colin Jones and Roy Porter (London: Routledge, 1994), 105-107.
Alan Lester has also argued that nineteenth century humanitarian discourses thrived when grounded in gruesome bodily details. Alan Lester, "Obtaining the `Due Observance of Justice': The Geographies of Colonial Humanitarianism," *Environment and Planning D: Society and Space* 20, no. 3 (2002): 286.
[56] Laqueur, "Bodies, Details, and the Humanitarian Narrative," quote on 195, also 178.
[57] Vernon, *Hunger*, 10-12, 273.
[58] Ibid, 42, 273.
[59] Harmke Kamminga and Andrew Cunningham, "Introduction: The Science and Culture of Nutrition, 1840-1940," In *The Science and Culture of Nutrition, 1840–1940* (Amsterdam: Editions Rodopi, 1995), 3-5, 8-9; Carpenter, *Protein and Energy*, 131.

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acquired quantitative contours and focused on investigating input-output equations of bodily processes and the foods consumed.[60] Nineteenth-century nutritional science was centered on the role of different foods in economically furnishing dietary requirements of energy and protein in a way that bolstered workers' efficiency and productivity.[61] In the realm of medicine, the bureaucratization and professionalization of the field of Western medicine throughout the eighteenth century led to the progressive standardization of biomedical models, and uniformization of medical assessments along the nineteenth century.[62]

In the second half of the nineteenth century, an emerging humanitarian conception of hunger countered a neo-Malthusian ascription of blame to the negligence of the hungry, by recasting the hungry as innocent victims of uncontrollable forces. News stories grounded on "first-hand experience" and new journalistic techniques that looked upon the famished with compassion instigated empathy among readers.[63] When this compassionate portrayal of the hungry began to permeate the news, gaining traction in the late nineteenth century, hunger acquired a humanitarian connotation that dismounted the Malthusian view of famine as a natural population check engendered by moral negligence and inability for improvement.[64] Now that hunger generated compassion, this newfound conception ushered the use of hunger as a tool of political critique, both against a precarious British liberal system and the colonial regime.[65]

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[60] Kamminga and Cunningham, "Introduction: The Science and Culture of Nutrition, 1840-1940," 4-5.
[61] Ibid, 5; Carpenter, "A Short History of Nutritional Science: Part 2 (1885-1912)," 975.
[62] Lock and Nguyen, *An Anthropology of Biomedicine*, 43-46, 68.
[63] Vernon, *Hunger*, 18, 21, 27-28.
[64] Ibid, 17, 42.
[65] Ibid, 44, 79.

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A turning point in the history of nutrition also came in the late nineteenth and early twentieth centuries. This period introduced a precise quantification of food's energy value through the measuring unit of the calorie.[66] Technically conceptualized, nutritional science granted an objective, quantifiable, and universal definition of hunger that ascribed a technical and standardized frame to hunger.[67] The calorie enabled the standardization and abstraction of nutrition, offering a simplified and comparative measure that "render[red] food […] politically legible."[68] This objectivity, reliant on empirical data from laboratory tests and capable of assessing abstract minimum dietary needs, effaced the diverse socio-cultural contexts that animate nutrition. Nutritional science did not go unchallenged, and, from anthropologists of nutrition to social nutritionists, attempts to situate nutrition within social and cultural milieux flourished.[69] Dietary deficiency diseases and their colonial experiments in the years closely preceding World War I instigated the identification of vitamins.[70] The discovery of vitamins firstly complicated, then complemented the thermodynamic model that grounded nutritional science's theory of the human body as powered by energy.[71] Vitamins ushered in the rise of a biochemical paradigm of nutrition that emphasized quality of diet over quantity, expanding the definition of hunger to *malnutrition* beyond its previously dominant view as an insufficient food intake.[72]

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[66] Nick Cullather, "The Foreign Policy of the Calorie," *The American Historical Review* 112, no. 2 (2007), 338, 340.
[67] Vernon, *Hunger*, 83, 87, 117.
[68] Cullather, "The Foreign Policy of the Calorie," quote on 338, also 342.
[69] Vernon, *Hunger*, 84-85, 96, 114, 134.
[70] Ibid, 90, 117.
[71] Ibid, 84; Kamminga and Cunningham, "Introduction," 10.
[72] Vernon, *Hunger*, 89, 117, 119-120.

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The post-World War I era came to be significantly grounded on and oriented by a scientific rationale. World War I served as a testing ground for nutritional science, prompting attempts at efficient supply planning, delineating the beginnings of science-based nutritional relief, and stimulating scientific research.[73] Nutritional science and the universal standard of the calorie significantly shaped the types of food destined for humanitarian operations in the post-World War I era.[74] Feeding stations distributed cooked food that had been nutritionally calculated and had to be consumed "on the spot" to ensure "the food would reach the children in conformity with their bodily needs."[75] The international relief operation to the Russian famine of 1921-1922 contributed to systematizing the logistics and control of relief distribution and the calculation of rations of aid.[76] Relief was infused with a mix of approaches: the distribution of food aid based on available supplies among attempts to combine surplus resources with nutritional science knowledge, and eugenic rationalizations of selective relief alongside the emergence of universal ideals of child welfare.[77]

The organization and conduct of relief to Austria in the post-World War I era further illustrates the emerging characteristics of a systematic, methodical and science-

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[73] Paul Weindling, "From Sentiment to Science: Children's Relief Organizations and the Problem of Nutrition in Interwar Europe," *Disasters* 18, no. 3 (1994): 204-205.
[74] Cullather, "The Foreign Policy of the Calorie," 348.
[75] E. Nobel, "Discussion," In *Post-War Nutritional Relief*, Chairman Lord Horder. Proceedings of the Nutrition Society 2, nos. 3-4 (1944): 201. With the exception of relief during the Russian famine and the US distribution of almost half a million tons of flour through credit loans to a handful of Eastern European countries, relief after World War I was chiefly directed at children through canteen meals. J.R. Marrack, "Experiences of the Last War and Since. Current State of Nutrition in Occupied Europe and Elsewhere," *Post-War Nutritional Relief*, Chairman Lord Horder. Proceedings of the Nutrition Society 2, nos. 3-4 (1944): 179.
[76] Tehila Sasson, "From Empire to Humanity: The Russian Famine and the Imperial Origins of International Humanitarianism," *Journal of British Studies* 55 (July 2016): 534-535; Bruno Cabanes, *The Great War and the Origins of Humanitarianism, 1918–1924* (New York: Cambridge University Press, 2014), 229.
[77] Weindling, "From Sentiment to Science," 204-206.

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based humanitarian nutrition design. By primary way of a medical inspection, children classified as undernourished according to the Pelidisi system were selected for feeding programs.[78] The Pelidisi system, devised by Austrian pediatrician von Pirquet, was a mathematical formula that calculated the relation between weight and sitting height to assess nutritional status. This calculation was complemented by a physical screening termed the Sacratama formula, that would examine the degree of the "blood (S) content of the skin, the fat (Cr) content of the subcutaneous tissue, the turgor or tension (T) of the subcutaneous tissue through its water content, and the development of the musculature (M)."[79] From the humanitarian discovery of hunger in the late nineteenth century, the "face of hunger" was predominantly portrayed in children's and women's suffering, especially anchoring sympathy on the child's emblematic innocence and vulnerable body.[80] During World War I relief, hungry children's bodies that digressed from medical and nutrition standards, became "objects of humanitarian intervention" to be medically controlled, surveyed and repaired.[81] The quantification of relief, scientific attempts to locate hunger in the body, and the centrality of the child marked the incipient beginnings of the medicalization of hunger and modern technocratic humanitarianism. The shift to science in relief was not homogenous and, in fact, research and aid in nutrition continued to be scattered.[82] We can see the interwar period, then, as beginning to delineate the

[78] Nobel, "Discussion," 201.
[79] Ibid, quote on 202, also 201; Henry Beeuwkes, *American Medical and Sanitary Relief in the Russian Famine, 1921-1923* (New York: American Relief Administration, 1926), 58-59.
[80] Vernon, *Hunger*, 31.
[81] Friederike Kind-Kovács, "The Great War, the Child's Body and the American Red Cross," *European Review of History* 23, no. 1-2 (2016): 39, 41-42.
[82] Weindling, "From Sentiment to Science," 207.

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contours of a targeted and technocratic response to hunger, heightened to a new level after World War II.[83]

Nutritional science in the interwar moved from a preoccupation with minimum dietary standards to the search for optimal nutrition.[84] In this period, nutrition rose to prominence when policy makers widely linked its centrality to population health, national economy and well-being. This was also the first moment when the international community tried to quantify and universally systematize dietary requirements.[85] The Health Organization of the League of Nations was central in prompting the standardization of nutritional standards, with special attention to physiological and clinical mechanisms, and the definition of methods, indicators and measurements.[86] The 1930s also saw a surge in the authority of social nutritionists, who acknowledged the role of socio-cultural environs on food and nutrition and the socio-economic roots of hunger.[87] The 1930s thus marked a contentious moment for nutritional science: coeval biochemical and thermodynamic paradigms in nutritional science, concurrent social and scientific nutritionists, and coexisting social views of hunger with liberal standpoints, neither side completely freed from moral prejudices.[88]

World War II expanded and systematized the conceptualization of hunger as a medical object.[89] However, the incipient traces of medicalization date from the 1920s,

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[83] Jenny Leigh Smith, "The Awkward Years: Defining and Managing Famines, 1944–1947," *History and Technology* 31, no. 3 (2015): 206-207.
[84] Weindling, "From Sentiment to Science," 205, 209.
[85] C. Sathyamala, "The Political Economy of Dietary Allowances," in *Handbook on Food: Demand, Supply, Sustainability and Security*, edited by Raghbendra Jha, Raghav Gaiha, and Anil B. Deolalikar (Cheltenham: Edward Elgar Publishing, 2014), 264-266.
[86] Weindling, "From Sentiment to Science," 207-208.
[87] Vernon, *Hunger*, 114, 119-120.
[88] Ibid, 90-91, 124-126, 132, 196-197.
[89] Simmons, "Starvation Science," 173, 181, 186.

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when the identification of vitamins and deficiency diseases pluralized hunger, distinguishing it into specific diseases.[90] In 1933, Dr. Cicely Williams classified a distinct form of nutritional disease she encountered in the Gold Coast, and, in 1935, termed it kwashiorkor. Until its acceptance into the medical cannon in the early 1950s, kwashiorkor galvanized contested scientific theories regarding its etiology.[91] The one mainstay of treatment along the 1940s and 1950s seemed to be the use of skimmed milk, which, along with a low-protein diet identified among children with kwashiorkor, led to the disease's classification as protein malnutrition. A contrast was quickly established to marasmus, a form of starvation derived from calorie deficiency.[92] Marasmus was a medical term, which dated back to the mid-seventeenth century and generally referred to a wasting or withering of children's bodies.[93] Until the close of the nineteenth century its causality was attributed to a range of medical conditions, starvation among them.[94] With the discovery of kwashiorkor and entailing scientific discussions, the medicalization of hunger was further delineated, deepening the distinction of hunger into different diseases and localizing the causes to biochemical determinants and internal bodily processes.[95]

The medicalized view of hunger expanded and solidified with World War II, strongly influencing hunger relief with a medical impulse. The integrated approach toward managing both starvation and infectious diseases contributed to raising the prominence of medical knowledge in relief at the same time that the management of

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[90] Scott-Smith, "Defining Hunger, Redefining Food," 247-248.
[91] Ibid, 249-250.
[92] Carpenter, *Protein and Energy*, 142-149, 159.
[93] The Oxford Dictionary traces the origin of marasmus to "mid 17th century: modern Latin, from Greek *marasmos* '‘ withering' ', from *marainein* '‘ wither' '." Oxford Dictionary of English, 3 ed., "Marasmus," ed. Angus Stevenson, 2010.
[94] W. Soltau Fenwick, "Report on the Pathology of Infantile Marasmus," *The British Medical Journal* 2, no. 1865 (1896): 829.
[95] Scott-Smith, "Defining Hunger, Redefining Food," 248-249.

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hunger was inscribed in a larger medical design.[96] This coupled to nutritional science's increasing prominence in nutrition policy making and relief planning in the postwar.[97] Nutrition was inserted in the scientific realm and its experts carried a plurality of backgrounds, from medicine to chemistry and pharmacology.[98] In this moment, a solid "militaristic style of management" guided relief action and shaped the employment of stable, efficient and mobile solutions to manage hunger that were increasingly technical and scientifically engineered.[99]

These features represented an increasing departure from how the relief of hunger had been conducted through history. Starting in the late eighteenth century and enduring throughout the nineteenth century, the soup kitchen model of relief prevailed as the "dominant technology in food relief."[100] The British experience of famine relief in the nineteenth century, internationally recognized for its scientific efficiency, was based on grain distribution and the establishment of public works projects that submitted the starving to earning meager wages for heavy labor.[101] Soup kitchens were organized around the distribution of recipes made from ordinary food in public or communal spaces, largely based on local networks of aid.[102] The rise of nutritional science did not immediately supersede the soup kitchen model and, in fact, only in the mid-twentieth century systems of school meals and communal kitchens began to systematically

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[96] Jessica Reinisch, "Introduction: Relief in the Aftermath of War," *Journal of Contemporary History* 43, no. 3 (2008): 374, 390.
[97] Ibid, 382-383; Vernon, *Hunger*, 117, 119-120, 151, 156-157.
[98] Joshua Ruxin, "Hunger, Science and Politics: FAO, WHO, and Unicef Nutrition Policies, 1945-1978" (PhD diss., University of London, 1996), 9.
[99] Scott-Smith, "Defining Hunger, Redefining Food," 132-133, 167-168.
[100] Scott-Smith, "On an Empty Stomach: Humanitarian Approaches to Hunger," 3.
[101] Aidan Forth, *Barbed-Wire Imperialism: Britain's Empire of Camps, 1876-1903* (California: University of California Press, 2017), 47, 61; Davis, *Late Victorian Holocausts*, 36; Sasson, "From Empire to Humanity," 523-524.
[102] Scott-Smith, "On an Empty Stomach: Humanitarian Approaches to Hunger," 3.

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integrate nutrition knowledge and the scientific design and management of spaces in the organization of relief.[103] The Second World War was therefore a moment of the confluence of different models: if we note the existence and expansion of community feeding initiatives, this was also the time when technical and individualized fixes to hunger surfaced amid a context of overwhelming humanitarian needs.[104] From food distribution and collective feeding spaces, a prevalent medical frame and increasing authority of nutritional science transformed the management of hunger in the mid-twentieth century to one based on technical foods and individualized interventions subjected to medical control.

1.5 Main Arguments and Structure of Chapters

Throughout this thesis, I use as guiding idea Scott-Smith's argument of a redefinition of food and hunger, starting with the emergence of nutritional science in the mid-nineteenth century and solidifying in the mid-twentieth century. Hunger was narrowly conceptualized as the result of physical and biochemical processes and food restricted to its constituent nutrients and biochemical elements. This reductionist view led to a deconstruction of diet, privileging expert knowledge, obscuring a more holistic definition of hunger and food, curtailing recipients' agency, and favoring technocratic and narrow solutions to hunger.[105] The research and analyses I draw out in the subsequent chapters uncover on their own distinctive characteristics of this shift. The following pages will recount a story of a particular medical gaze into hunger, a scientific prominence in assessments and relief, the blurred boundaries of food, nutrition and

[103] Vernon, *Hunger*, 174-175.
[104] Ibid, 180; Scott-Smith, "On an Empty Stomach: Humanitarian Approaches to Hunger," 3.
[105] Scott-Smith, "Defining Hunger, Redefining Food," 6, 26-28, 43-44, 142-143, 148-149, 153, 231.

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medicine, the integration of medical and nutritional aid, and the encounter of technical and ordinary solutions to hunger.

The first chapter of this thesis looks at the immediate post-World War II context. This scenario delineated an experimental arena for multiple hunger studies spanning various continents, from controlled nutrition studies of induced starvation, such as the Minnesota Starvation Project in the US to investigations conducted amid actual situations of starvation, such as the Warsaw studies in Poland. I argue that this aura of experimentation and surge of medicalization shaped responses to hunger of a strong medical and technical character, from the use of protein hydrolysates to plasma and pharmaceutical substances, at the same time that experts employed food and advocated for its value in the management of hunger. This chapter explores in detail the defining features of the medicalization of hunger, drawing out how scientific studies created categories to classify hunger in different types and segment it into different stages, localized the cause and solution to hunger upon specific physiological mechanisms, and delineated medically and nutritionally-designed protocols of rehabilitation. I conclude that the medical frame gave way to ambivalent and various approaches to managing hunger in the postwar relief moment: the concurrent use of technical solutions alongside ordinary food, coupled with a view of food as medicine.

Chapter two moves into the late 1950s until the 1970s, which shifted the bodies and geographies of hunger from an European focus to a reorientation upon developing countries and the emaciated African child.[106] Besides remarking the continuing features

[106] Heike Wieters, "Reinventing the Firm: From Post-War Relief to International Humanitarian Agency," *European Review of History: Revue Européenne d'Histoire* 23, nos. 1-2 (2016): 122; Davey, Borton, and Foley, *A History of the Humanitarian System*, 10.

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of medicalization, I analyze the global web of nutrition knowledge that saw Western scientists' focus on investigating hunger in developing countries and the increased prominence of experts from developing countries in the international arena. The diverse thematic composition of the nutrition field also expanded through the 1970s, featuring experts on economy, agriculture and social sciences.[107] I specifically probe the convergence of scientific paradigms and frameworks, which illuminate well the plural conceptions of hunger and coexisting scientific paradigms that informed responses to hunger. This amalgam was evident from experts who retained narrow scientific perspectives to others who bore more comprehensive outlooks, from researchers who saw malnutrition as primarily a protein deficiency to dissenting voices that challenged this etiology, and from paternalist and science-centered project designs to attempts at more locally integrated solutions. Such heterogeneity, however, did not weaken the influence of medico-scientific frameworks in shaping the conceptions and responses to hunger or diminish the resort to techno-scientific solutions amidst distinct regimens for managing malnutrition.

The final chapter starts off in the 1990s and carries the discussion to contemporary times. The change in the nature of hunger that started in the 1960s with the reorientation toward poverty-stricken contexts instead of widespread crisis of acute starvation was further consolidated in the late twentieth and early twenty-first centuries, when hunger was overall centered on endemic malnutrition. The focus of the chapter is upon one specific humanitarian technology developed in the 1990s: Plumpy'Nut®, the first and most prominent RUTF. I especially look to its deployment in light of the experience of

[107] Ruxin, "Hunger, Science and Politics," 335-336.

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MSF during the 2005 Niger famine. Plumpy'Nut® illustrates the continuance of techno-scientific solutions to hunger, epitomizes the centrality and consolidated place of the market in designing and prescribing humanitarian foods, and illuminates the larger contours of humanitarian designs.[108] I expand Scott-Smith's analyses in bringing a detailed examination of MSF's perception and advocacy of Plumpy'Nut® and linking the longer thread of medicalization in the 1990s and early 2000s.

I argue that the enduring presence of the features of the medicalization of hunger attests to the continued importance of a medical lens as an explanatory frame in the conceptualization and management of hunger. I also explore the global character of nutrition knowledge, noting how the presence of geographically-diverse experts in nutrition forums of international organizations contribute to enlarging the representativeness of perspectives. From the 1990s onwards, nutritional expertise continued to amass a breadth of geographical and thematic fields, from medical and mathematical sciences to development and ecology. However, in line with the global trend of enhancing diversity without implementing inclusive approaches, hierarchies of knowledge still permeated international arenas.[109] If limited and inadequate responses to hunger, technically-engineered solutions illuminate the needs and architecture of modern humanitarianism: a technocratic assemblage that prizes standardization, wide reach, immediacy and medical and nutritional efficiency.

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[108] Scott-Smith, "Defining Hunger, Redefining Food," 221-222, 227; Scott-Smith, "The Fetishism of Humanitarian Objects and the Management of Malnutrition in Emergencies," 921-922, 926-927.
[109] As Matthew Connelly has remarked, "One of the key problems of contemporary history is to understand how world politics is becoming more pluralistic without becoming more democratic." Connelly, "AHR Conversation," 1461.

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Chapter 2

Hunger as Disease, Relief as Treatment: Centering the Starving Body and Blending Food with Technical Solutions

2.1 Introduction

Following post-World War I developments, World War II marked another critical point for humanitarian nutritional relief. If humanitarianism in the interwar was only beginning to articulate coordinated action, in the post-World War II era it was marked by a growing professionalization, planning mentality, interaction with states, increasing global reach and a slow shift toward need-based aid.[1] Relief after World War II was guided by early planning and a reliance on scientific expertise, whereby nutritional science assumed predominance in evaluating, defining and devising solutions to nutrition problems.[2] Further, following World War II, a prevalent "military-medical paradigm" guided humanitarian action.[3] This chapter will explore the overarching framework guiding humanitarian nutritional relief in the post-World War II era, and more specifically investigate the medical contours that encompassed the conceptualization of and responses to hunger.

In this chapter, I advance three main arguments. Firstly, the postwar medicalization of hunger was driven by an intensified medical scrutiny into hunger. World War II was a stage for ever more intricate hunger studies, an experimental arena

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[1] Michael Barnett, *Empire of Humanity: A History of Humanitarianism* (Ithaca: Cornell University Press, 2011), 107-108, 112-115.
[2] Jessica Reinisch, "Introduction: Relief in the Aftermath of War," *Journal of Contemporary History* 43, no. 3 (2008): 376-378, 382-383.
[3] Tom Scott-Smith, "Defining Hunger, Redefining Food: Humanitarianism in the Twentieth Century" (PhD diss., University of Oxford, 2014), quote on 117, also, 131-133, 243-245.

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that stimulated elaborate medical investigations of the starving body and furthered the employment of expert knowledge in the assessment and management of hunger. Hunger studies spanned different continents, encompassing the United States, Western Europe, the Soviet Union, Poland, Greece and India. The diverse sites producing and discussing medical knowledge on hunger tell us of the wide reach of knowledge circulation, the constraints imposed by the war, and the proponents of knowledge. Medical studies on hunger focused on micro biological and biochemical processes, permeating hunger analyses with medico-scientific methodologies and techniques, and stimulating the definition of different medical categories and specific classification schemes. Responses to hunger were also segmented according to medical categories and assumptions about the starving body's capacities primarily based on physiologic examinations and a scientific rationale.

Second, solutions to hunger became more technical, specific and integrated with the management of other concurrent or aggravated medical conditions, and food itself became a form of treatment. Hunger relief, therefore, transformed into treatment. Finally, the convergence of politico-economic, bureaucratic, and scientific forces in the postwar shaped a type of hunger management of a strong experimental nature that meshed food and technical solutions, with a special emphasis on the novel protein hydrolysates. Protein hydrolysates are fragmented proteins derived from chemical or enzymatic hydrolysis, which enable the provision of proteins without a digestive burden.[4] We will see an ambivalent approach of dismissing and insisting on their use, based on experiences in the Bengal famine and relief to liberated Europe.

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[4] F. Homburger, "Use of Protein Hydrolysates by Mouth," *The American Journal of Medicine* 3, no. 4 (1947): 430.

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This chapter attempts to move beyond the existing, if scarce, works that grapple with the medicalization of hunger and its management to unravel arguments still underemphasized in the literature. In particular, I note how the medicalization of hunger crafts plural approaches to relieving hunger, though these diverse responses were predominantly viewed as a form of treatment. This character of treatment is evident in the heightened medical view over the assessment and response to hunger. The medical knowledge that uncovered the starving body's debilities and prescribed differential schemes of care, the management of hunger in medically-structured settings, the integration of hunger within broader disease therapy protocols, and the view of food as medicine were marked features of the medicalization in its postwar course. This overarching medical framework transformed the management of hunger into treatment.

2.2 Planning Relief and Assessing Needs

When World War II was still running at full steam, Allied intellectuals, aid and medical professionals began assessing the enormous European relief effort that would follow the conflict and urged the implementation of carefully planned and concerted operations.[5] There was a particular concern for not repeating some of the relief problems encountered after World War I, namely, a slow responsiveness, political hindrance, and insufficient funding and supply of aid. These flaws were largely attributed to a lack of coordination and early planning among aid organizations as well as an absence of oversight from an intergovernmental agency.[6] World War I relief experiences, therefore, crucially shaped post-World War II humanitarian aid, both in the immediate planning and

[5] Ben Shephard, "'Becoming Planning Minded': The Theory and Practice of Relief 1940–1945," *Journal of Contemporary History* 43, no. 3 (2008): 406-408.
[6] Reinisch, "Introduction," 375, 378.

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provision of relief during the 1940s and in the lasting reverberations for contemporary humanitarianism.[7]

Across Europe, experts discussed postwar relief. They were permeated by a confidence in the nutritional science advances since the end of World War I. Dr. Evang, from the Royal Norwegian Ministry of Social Welfare, for example, dismissed the nutrition evaluations during the First World War for largely not being conducted "on a really scientific basis", and, with hindsight, saw it as "natural that our knowledge of the effects of faulty diet during the first World War is not particularly thorough."[8] Miss Hume of the Lister Institute in Cambridge enthusiastically stated that the post-World War II relief scheme would be faster and more efficient given developments in nutrition knowledge that cemented nutritional science's authority.[9] Dr. Meiklejohn, a nutritional adviser to the United Nations Relief and Rehabilitation Agency (UNRRA), highlighted the solid scientific and multidisciplinary character that nutrition analyses had acquired by the end of the Second World War.[10] In spite of this exalted progress in nutritional science, Dr. Evang recognized that the nutrition problem after World War II would be principally guided and solved by factors such as "available stocks, production capacity and transport facilities."[11] Politics seamlessly seeped into scientific aid discussions.

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[7] Johannes-Dieter Steinert, "British Humanitarian Assistance: Wartime Planning and Postwar Realities," *Journal of Contemporary History* 43, no. 3 (2008): 421, 434.
[8] K. Evang, "Discussion," in *Post-War Nutritional Relief*, Chairman Lord Horder, *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 183-184.
[9] E. Margaret Hume, "Opportunities for Nutritional Research in the Work of Relief," in *Post-War Nutritional Relief*, Chairman Lord Horder, *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 205-206, 208.
[10] A. P. Meiklejohn, "Discussion," in *Post-War Nutritional Relief*, Chairman Lord Horder, *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 211.
[11] Evang, "Discussion," 188-189.

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The World War II "planning-fever" saw efficient relief embodied in early planning and logistical organization tied to well-coordinated processes, thus favoring administrative fixes.[12] There was a vigorous belief that the relief planning machinery needed to be sophisticated.[13] Preoccupation with planning stimulated the creation of new agencies, both national and intergovernmental, to coordinate the different actors involved in the provision of postwar relief. The Inter-Allied Committee on Post-War Requirements, for instance, was created in 1941 with the objective to calculate relief requirements for the array of supplies liberated countries would need.[14] In 1942, the formation of the Council of British Societies for Relief Abroad (COBSRA) aimed to bridge state, voluntary and international organizations as well as disseminate information, professional trainings and guidance.[15] The establishment of the UNRRA in November of 1943 was another response to this wave of planning, while also being neatly aligned to the United States' interest in erecting mechanisms of international cooperation and the Allies' conception of relief as strategic to war diplomacy.[16] In fact, the UNRRA was designed to epitomize the science-based, rationalized, coordinated and planning-oriented pillars of postwar humanitarian relief.[17]

It was not only a planning-mindedness that would guide post-World War II relief efforts. The provision of relief was also oriented by a faith in science and expertise, which, though not novel, assumed stronger contours after World War II. This coupled to

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[12] Reinisch, "Introduction," 376.
[13] J. Hammond, "Problems of Production in Relation to Post-War Nutritional Relief," in *Post-War Nutritional Relief*, Chairman Lord Horder. *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 194.
[14] Reinisch, "Introduction," 377-378.
[15] Steinert, "British Humanitarian Assistance," 423, 425.
[16] Shephard, "'Becoming Planning Minded'," 408-411.
[17] Eleanor Davey, John Borton, and Matthew Foley, *A History of the Humanitarian System: Western Origins and Foundations* (London: Overseas Development Institute, June 2013), 20.

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the predominant role that nutritional science assumed within relief planning and execution. There was an overall confidence that nutritional knowledge and new technologies would tame hunger.[18] The newly-established Food and Agriculture Organization (FAO), for example, with its emphasis on scientific and technical knowledge, highlighted the prominence of the nutrition expert as what one scholar has denoted "the ultimate hunger problem-solver."[19] Nutrition experts showed greater prominence not only in assessing nutrition problems in the postwar, but also in devising dietary minimums, efficient relief diets, and alternatives in face of the scarce variety of available food.[20] The ascendance of nutrition experts' relevance came at a time when the field of nutrition encompassed professionals from diverse areas, from medicine to chemistry and pharmacology.[21]

Concurrently, from the late 1940s, humanitarian organizations increasingly developed standardized and bureaucratic practices akin to capitalist rationalization.[22] The professionalization of humanitarianism began to evaluate expertise on the basis of technical knowledge instead of valuing practical experience and socio-cultural knowledge.[23] Confidence and reliance in this technical expansion and specific expertise narrowed the scope of action for managing hunger. In an opinion piece in *The Lancet*, famines were portrayed as "complex economic events," that demanded a "complex and a

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[18] Reinisch, "Introduction," 382-383.
[19] Joshua Ruxin, "Hunger, Science and Politics: FAO, WHO, and Unicef Nutrition Policies, 1945-1978" (PhD diss., University of London, 1996), quote on 86, also 82-85.
[20] Evang, "Discussion," 187; Hammond, "Problems of Production in Relation to Post-War Nutritional Relief," 190-191; A. Daniel, "Discussion," in *Post-War Nutritional Relief*, Chairman Lord Horder, *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 196.
[21] Ruxin, "Hunger, Science and Politics," 9.
[22] Heike Wieters, "Reinventing the Firm: From Post-War Relief to International Humanitarian Agency," *European Review of History: Revue Européenne d'Histoire* 23, nos. 1-2 (2016): 118.
[23] Barnett, *Empire of Humanity*, 236.

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highly technical […] [response]. It is a task for the specialist and the administrator."[24] We note how, even if there was an awareness of the complex and multifaceted causes of famine, the prescribed responses became increasingly technocratic and expert-oriented. Within this context, planning relief was preoccupied, for instance, with quantitative assessments of resources and logistics, survey monitoring, population groups of observation, employment of up to date statistical methodologies, and emission of ration cards.[25]

This post-World War II scenario reinforced a reductionist and quantitative view of nutrition. A biochemical view of nutrition permeated nutrition assessments. In 1943, a nutritional assessment in Great Britain under the auspices of the British Medical Research Council evaluated the population's nutrition with primary reference to the blood's hemoglobin content and using serum protein projections as a secondary indicator.[26] From the beginning of the twentieth century, the quantification of calories into a standardized measuring unit enabled their use as an international and uniform comparative stick and tool of statecraft by providing a scientific rationalization for food management. The quantification of the calorie furnished nutrition with a technocratic and simplified dimension, ranking and valuing food on the basis of its caloric content. This view also influenced famine relief, dictating the amounts and types of food that were deemed most

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[24] "Relief of Europe." *The Lancet* 244, no. 6312 (1944): 248.
[25] A.E. Russell, "The Organization of Nutritional Relief in the Field," in *Post-War Nutritional Relief*, Chairman Lord Horder, *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 197; A. L. Bacharach, "Discussion," in *Post-War Nutritional Relief*, Chairman Lord Horder, *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 213.
[26] "Medicine In The 1939-45 War: Report of Medical Research Council." *The British Medical Journal* 1, no. 4558 (1948): 944.

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efficient.[27] During and after World War II, European planning discussions heralded a biochemical view of nutrition and interchangeably regarded food as nutrients and as calories. In a summary of Sir Jack Drummond's review of the famine scenario in Europe, the central nutritional issue in the European postwar setting was the provision of an adequate amount of *calories*. The creation and use of categories stipulating nutritional adequacy or deficiency in terms of calories shows the reliance on scientific standards to assess the boundaries of health and disease.[28] Dr. Evang claimed that "people will *ask for calories first* […] they do not first and foremost ask for protective foods or for vitamins, but *for grain and fat*."[29] Here, food is understood according to its high caloric content and exemplified as both a type of food and as nutrients. Dr. Marrack assessed that the "deficiency of animal products, meat, milk, cheese and butter, is more serious than that of calories."[30] In this analysis, Dr. Marrack viewed plain food according to its nutrient content, but granted predominance to protein and fat, in contrast to calories, understood as carbohydrates.

Besides contentions on what constituted primary relief needs, planning discussions also recognized the need to provide food in its holistic sense. Heathcote, from Britain's Famine Relief Committee, asserted in the nineteenth meeting of the Nutrition Society that "It will not be a case of worrying about specific details of the diet, it will be a

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[27] Nick Cullather, "The Foreign Policy of the Calorie," *The American Historical Review* 112, no. 2 (2007): 338-339; 342; 345; 347-348.
[28] "Famine and Malnutrition in Europe: Sir Jack Drummond's Review," *The Lancet* 247, no. 6397 (1946): 512-513.
[29] Evang, "Discussion," 188, my emphasis.
[30] J. R. Marrack, "Experiences of the Last War and Since. Current State of Nutrition in Occupied Europe and Elsewhere," in *Post-War Nutritional Relief*, Chairman Lord Horder, *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 182.

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case of getting food over in quantity."[31] Dr. Chick of the Lister Institute professed along similar lines that, "The chief deficiency which is likely to be encountered in the occupied countries […] is plain lack of food, food of any kind, to provide sufficient calories for the body's needs."[32] Dr. Magee from the British Ministry of Health also voiced on the same occasion that "People will want food in the first instance."[33] This chapter will subsequently explore the tensions of humanitarian nutrition amidst this medical and biochemical reductionism in assessing and devising nutritional solutions to hunger.

The technical veil of postwar relief, however, was fractured by an underlying politics that differentiated receivers of aid and made the evaluation of needs a burdensome bureaucratic process. Further, the delivery of relief was imbued with the short-term goals of consolidating Allied military victories and long-term objectives of designing the new postwar world order, and securing politico-economic rehabilitation and stability.[34] British relief work, for instance, was integral to its occupation policy in Germany, ensuring military staying power and democratic health.[35] Post-World War II relief had, thus, a strong political and military determinacy. The health emergencies and civilian distresses were not "viewed from a strictly 'humanitarian' perspective," but regarded for their threat to military operation plans and control over liberated territories.[36] The military experience in managing liberated territories, especially in Italy and France,

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[31] J. G. Heathcote, "Discussion," in *Science and Post-War Relief*, Chairman Professor D. Murray Lyon, *Proceedings of the Nutrition Society* 3, no. 1 (1945): 67.
[32] Harriette Chick, "Nutritional Researches in Vienna after the First World War," in *Science and Post-War Relief*, Chairman Professor D. Murray Lyon, *Proceedings of the Nutrition Society* 3, no. 1 (1945): 66.
[33] H. E. Magee, "Some Effects of Inanition and their Treatment," in *Science and Post-War Relief*, Chairman Professor D. Murray Lyon, *Proceedings of the Nutrition Society* 3, no. 1 (1945): 53.
[34] Reinisch, "Introduction," 380-381, 386-387.
[35] Steinert, "British Humanitarian Assistance," 433, 435.
[36] Silvia Salvatici, "'Fighters Without Guns': Humanitarianism and Military Action in the Aftermath of the Second World War," *European Review of History: Revue Européenne d'Histoire* (2017): 5-6.

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contributed to shaping the World War II relief scenario. In Italy, military personnel applied modern medical knowledge on vitamins and the DDT insecticide combined with military planning and strategies to deliver rations and control the health conditions.[37] Beginning in the interwar and culminating after World War II, humanitarianism was "intimately entwined" with the military, incorporating military procedures into aid practices and shaping a preoccupation with order, efficiency, and mobility, which thereafter crystallized into humanitarianism's foundation.[38] Military protocols, rations, and logistics permeated ordered humanitarian feeding schemes, efficient nutrient composition and calculation of diets, and mobile, durable and standardized relief items. A military mindset also imparted a paternalistic character to humanitarian practice.[39] Along these lines, military power was a significant underlying force of postwar relief efforts and also constitutive of contemporary humanitarian designs.[40]

2.3 An Expanded Experimental Arena for Hunger Studies

World War II did not only propel a more coordinated, bureaucratized, and professionalized humanitarian field and the augmentation of a specific view of nutrition. It also provided a vast arena for new scientific studies that would further medical interest and scrutiny into the starving body – a significant component in the medicalization of hunger. The devastated scenario of World War II produced an experimental arena for multiple fields of study, from medicine to engineering, economy and agriculture, and demanded an unparalleled involvement of experts, both in the formulation and

[37] Shephard, "'Becoming Planning Minded'," 415, 417-418.
[38] Scott-Smith, "Defining Hunger, Redefining Food," 131-133.
[39] Ibid, 154-155, 161-163.
[40] Salvatici, "'Fighters Without Guns'," 5.

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implementation of projects.[41] Since the late nineteenth century, scientific studies of fasting and starvation in animals and humans examined physiological markers, such as body mass, nitrogen excretion, and clinical details.[42] Nutrition science in the colonies operated at the limits of life, conducting human experiments on minimum dietary allowances and deficient diets. These hunger studies were limited compared to the extensive experiments that would follow World War II.[43] World War II transplanted starvation experiments from the colonies to the metropole. Nutritional science came to conceptualize hunger as a disease, and its view of food, abstracted to only nutrients, was recast as medicine.[44]

In this context, hunger was one domain that attracted scientific activity. Dr. Harriette Chick, recounting her experiences on nutritional research in Austria after World War I, foresaw that the post-World War II relief setting would dismally provide an experimental stage for starvation studies. She further contemplated that ethical dilemmas would pervasively raise questions on how to manage control groups when populations were in need of immediate assistance.[45] Dr. Denny-Brown also evaluated that prisoner of war camps "provided data on the effect of dietary insufficiency, on a scale that *experimental*

[41] Reinisch, "Introduction," 384-385.
[42] Jean-Hervé Lignot and Yvon LeMaho, "A History of Modern Research into Fasting, Starvation, and Inanition," in *Comparative Physiology of Fasting, Starvation, and Food Limitation*, ed. Marshall D. McCue (New York: Springer, 2012), 8-9.
[43] Dana Simmons, "Starvation Science: From Colonies to Metropole," In *Food and Globalization: Consumption Markets and Politics in the Modern World*, eds. Alexander Nutzenadel and Frank Trentmann (New York: Berg, 2008), 174-179.
[44] Ibid, 177-178, 186; Scott-Smith, "Defining Hunger, Redefining Food," 337.
[45] Chick, "Nutritional Researches in Vienna after the First World War," 63; 66-67.

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medicine can hardly hope to emulate," even as he lamented the scarcity of "accurate data" on "clinical and pathological effects."[46]

From the United States and Western Europe to the Soviet Union, Poland, Greece and India, the hunger studies of the 1940s pointed to the international character of medical knowledge, as well as to the constraints the war's arrangement of forces imposed on the circulation of knowledge. The Warsaw studies' occurrence in the midst of World War II provided a singular context for a unique investigation into starvation through its deteriorating course.[47] The Jewish doctors confined by the Germans in the Warsaw ghetto, in Poland, decided to seize the hunger pervasive in their everyday as an experimental opportunity for scientific research. From February until late July 1942, when forced deportations began, these doctors made the starvation they suffered their object of study. The doctors persisted with research in the hospitals and laboratories available under the circumstances of improvised and deteriorating infrastructure, lack of supplies, and deprived communications from the outside world and scientific community.[48] It is striking how the research was outlined to select individuals free from concurrent diseases, so as to meticulously examine "pure hunger disease" through detailed clinical, metabolic, circulatory, ocular and anatomical observations and analyses. In spite of its abrupt interruption, fragmentation and diverse limitations in its elaboration, the Warsaw studies became a cornerstone in the medical science of hunger after its

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[46] D. Denny-Brown, "Neurological Conditions Resulting from Prolonged and Severe Dietary Restriction," *Medicine* 26, no. 1 (1947): 41, my emphasis.
[47] Myron Winick, ed., *Hunger Disease: Studies by the Jewish Physicians in the Warsaw Ghetto*, trans. from the Polish by Martha Osnos (New York: John Wiley & Sons, 1979), 38.
[48] Israel Milejkowski, "Introduction," Warsaw, October 1942, in *Hunger Disease: Studies by the Jewish Physicians in the Warsaw Ghetto*, ed. Myron Winick, trans. from the Polish by Martha Osnos (New York: John Wiley & Sons, 1979), 3-5; Winick, *Hunger Disease*, vii, xi.

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complete release in English in 1979 (the manuscript was published in Polish and French versions in 1946, with only limited availability and reach).[49]

The Leningrad blockade functioned as another arena of medical experimentation. In 1941 and 1942, the pervasive hunger that prevailed in Leningrad provided a stage of "experimental nakedness" into scientific studies of hunger "at the limit." In a Soviet context where hunger was silenced, World War II yielded a new medical conception of hunger and medical interest in investigating, categorizing, and devising solutions to hunger.[50] This medical conception of hunger was not geographically circumscribed to Leningrad. It spread to the Soviet Gulags and as far as Germany and territories liberated by the Red Army.[51]

World War II also catalyzed the experimentation of controlled human nutrition studies of induced starvation. Still amidst the war, in the end of 1944, at the University of Minnesota, physiologist Ancel Keys began to coordinate a medical and nutritional experiment to augment scientific research on the physiology and psychology of hunger and contribute to the relief of European hunger in the postwar. The project began with a three month standardization period as a baseline for a series of physiological markers, which would be tested against a semi-starvation period of six months and later juxtaposed with three months of relief.[52] The Laboratory of Physiological Hygiene of the University of Minnesota supplied the necessary infrastructure for tracking and measuring various tests while this setting increased the scientific aura of the study. These tests ranged from

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[49] Winick, *Hunger Disease*, viii-xi.
[50] Rebecca Manley, "Nutritional Dystrophy: The Science and Semantics of Starvation," in *Hunger and War: Food Provisioning in the Soviet Union During World War II*, ed. Donald Filtzer and Wendy Goldman (Bloomington: Indiana University Press, 2015), 219, 221, 260, 264.
[51] Ibid, 252-253, 255-257.
[52] Leah M. Kalm and Richard D. Semba, "They Starved So That Others Be Better Fed: Remembering Ancel Keys and the Minnesota Experiment," *The Journal of Nutrition* 135, no. 6 (2005): 1347-1348.

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physical exertion and psychomotor to intellectual and psychological assessments and were accompanied by electromagnetic imaging, electrocardiograms, laboratory and metabolic exams.[53] An article reporting some of the project's findings focused on a series of indicators, such as weight loss, extracellular fluids, plasma protein concentration, and venous pressure, and the methods of calculation employed. In all, the article was intent on demonstrating the clinical and biochemical characteristics of famine edema, so as to hypothesize its pathogenesis.[54]

Scientific studies of hunger in the immediate aftermath of war followed this medical impulse toward clinical and internal analyses. They focused on investigating, for example, blood sugar levels, albumin content, plasma protein estimations, and nitrogen amounts of the starving body.[55] A review of the nutritional situation and relief work in Western Holland carefully depicted the clinical picture, with a focus on noting, among other elements, the muscular tonus, skin aspects, body temperature, blood pressure, heart rate, white cell count, hemoglobin content, and bone complexion.[56] A review of a study of hunger edema in children from 1941 to 1943 in Greece began with a detailed clinical description of the cases and results of laboratory findings. The review used a number of medical terms, such as anasarca, ascites, hydrothorax, and hydropericardium to more specifically designate fluid accumulation, while there was also attention to the general clinical account, by noting the presence of "hypothermia, bradypnea, basal pulmonary

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[53] Kalm and Semba, "They Starved So That Others Be Better Fed," 1348.
[54] Ancel Keys et al., "Famine Edema and the Mechanism of Its Formation," *Science* 103, no. 2683 (1946): 669-670.
[55] M. L. Chakrabarty, "Blood-Sugar Levels in Slow Starvation," *The Lancet* 251, no. 6503 (1948): 597; Janet Vaughan, C. Dent, and R. Pitt Rivers, "The Value of Hydrolysates in the Treatment of Severe Starvation," in *Discussion: The Physiology and Treatment of Starvation*, President Dr. Geoffrey Evans, *Proceedings of the Royal Society of Medicine* 38, no. 7 (1945): 395.
[56] Nutrition Reviews, "Starvation: 1945," *Nutrition Reviews* 4, no. 1 (1946): 28-29.

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rales, bradycardia, distant heart sounds, and hypotension […] Furunculosis, fine desquamation of the skin over the chest, gastrointestinal disturbances, and polyuria."[57] The study's focus on biochemical analyses was marked by laboratory examinations and the preoccupation with measuring serum protein levels during hunger edema, through testing different diets, and the changes produced in serum protein concentration.[58]

These medical investigations highlight how medical traits pervaded the primary methodology and techniques that guided hunger studies. The Warsaw studies ingeniously employed extremely sophisticated and detailed methods and measurements, markedly in the carbohydrate metabolism and circulatory analyses.[59] A 1942 nutritional study of the French camps in Nimes was concerned with conducting a "*methodical medical examination* of all the inhabitants […] they were weighed and measured, undressed. Their medical histories were noted, their pulse rates and arterial blood pressures were recorded […] and the findings were entered on individual record cards. The investigation had to be restricted to simple and rapid examinations, as is necessary in the study of large groups."[60] This research was preoccupied with a systematic scientific observation of manifestations and nutritional responses, meticulous clinical descriptions and spatial isolation to control the management of the starving.[61] Chakrabarty's study of blood-sugar

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[57] Nutrition Reviews, "Hunger Edema in Children," *Nutrition Reviews* 6, no. 9 (1948): quote on 280, also 279.
[58] Ibid, 280-281.
[59] Julian Fliederbaum, "Metabolic Changes in Hunger Disease," Warsaw, October 1942, in *Hunger Disease: Studies by the Jewish Physicians in the Warsaw Ghetto*, ed. Myron Winick, trans. from the Polish by Martha Osnos (New York: John Wiley & Sons, 1979), 82-83; Emil Apfelbaum-Kowalski, "Pathophysiology of the Circulatory System in Hunger Disease," Warsaw, October 1942, in *Hunger Disease: Studies by the Jewish Physicians in the Warsaw Ghetto*, ed. Myron Winick, trans. from the Polish by Martha Osnos (New York: John Wiley & Sons, 1979), 131-133.
[60] René Zimmer, Joseph Weill, and Maurice Dubois, "The Nutritional Situation in the Camps of the Unoccupied Zone of France in 1941 and 1942 and Its Consequences," *The New England Journal of Medicine* 230, no. 11 (1944): 303-304, my emphasis.
[61] Ibid, 305-306.

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levels during the 1943 Bengal famine also showcased a meticulous selection criteria, methodology and results, centered on identifying the low levels of blood-sugar in starvation and the response elicited with glucose injections, as well as the anatomical characteristics revealed through autopsies.[62]

The medicalization of hunger thus shifted attention to internal examinations of the body, through scientific studies that traversed vast geographical spaces. This medicalization of hunger pathologized hunger and its bodily manifestations, adopting a scientific and impersonal language to describe its course. In a paper based on a study of Danes held in German internment camps, the authors described the need to "arrest the destruction of body tissues and enable regeneration."[63] In Dr. Denny-Brown's account of former prisoners of war who had faced dietary constraints, "the *pathology* of a *deficiency disease* leads to *slowly progressive disorder* of function and structure, commensurate with the *cumulative biochemical defect*."[64] The 1942 nutritional study of the French camps in Nimes consistently medicalized hunger and referred to it as a syndrome, a pathogenic factor, a disease akin to an epidemic, almost to the extent of regarding hunger as a contagious condition.[65] Not only did the Warsaw studies put forth the view that hunger, in itself, constituted a disease, but they also uncovered "new syndromes" characteristic of hunger, such as "atony of the lungs" and excess fluid in the pleural and

[62] Chakrabarty, "Blood-Sugar Levels in Slow Starvation," 596-597.
[63] "Treatment of Famine Disease," *Acta Psychiatrica Scandinavica* 28, no. s83 (1953): 255.
[64] Denny-Brown, "Neurological Conditions Resulting from Prolonged and Severe Dietary Restriction," 92.
[65] Zimmer, Weill, and Dubois, "The Nutritional Situation in the Camps," 303, 305-306, 314.

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abdominal cavities. [66] One of the physicians summarized well the studies' aim to elucidate that "[…] the *syndrome* of persistent hunger is a *definite pathological entity*."[67]

2.4 Classifying and Segmenting Hunger

The medicalization of hunger amid this heightened scientific interest furthered a proliferation of classifications and the differentiation of hunger into stages. Hunger was expanded to amass various conditions of specific kinds and gradations.[68] This provided an impetus for the classification of hunger into different types and designation of symptoms, demarcating the boundaries, for instance, of marasmus, kwashiorkor, nutritional deficiencies, famine edema, hunger cachexia, hunger diarrhea, and famine anemia.[69] Amid this categorization frenzy, Zimmer, Weill, and Dubois identified and differentiated multiple clinical forms of starvation, such as the wet, dry, anemic, and neurologic. The authors emphasized the relevance of establishing clinical categories for both the management of starvation and scientific development.[70] In the Soviet Union, the Leningrad blockade and research into hunger produced a new and homogeneous medical condition from the plural designations of hunger extant before World War II: dystrophy, generated by a deficient intake of food. The segmentation of hunger even characterized

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[66] Julian Fliederbaum, "Clinical Aspects of Hunger Disease in Adults," Warsaw, October 1942, in *Hunger Disease: Studies by the Jewish Physicians in the Warsaw Ghetto*, ed. Myron Winick, trans. from the Polish by Martha Osnos (New York: John Wiley & Sons, 1979), 15-16, 18, 20; Anna Braude-Heller, Israel Rotbalsam, and Regina Elbinger, "Clinical Aspects of Hunger Disease in Children," Warsaw, October 1942, in *Hunger Disease: Studies by the Jewish Physicians in the Warsaw Ghetto*, ed. Myron Winick, trans. from the Polish by Martha Osnos (New York: John Wiley & Sons, 1979), 52-54.
[67] Apfelbaum-Kowalski, "Pathophysiology of the Circulatory System in Hunger Disease," 144, my emphasis.
[68] Scott-Smith, "Defining Hunger, Redefining Food," 247.
[69] For a discussion of some of these terms, please see *Acta Psychiatrica Scandinavica* 28, no. s83 (1953), especially chapters IV, V, VII and XVI; see also, Winick, *Hunger Disease*, 59.
[70] Zimmer, Weill, and Dubois, "The Nutritional Situation in the Camps," 306-308.

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specific types of dystrophy, such as the "edematous and non-edematous."[71] Alex Paton depicted vividly his medical experience in Belsen, where we again grasp the medical scrutiny and desire for classifications: "The *patient had famine oedema* and all the organs were appreciably atrophied, but there was an enormous abscess, probably tuberculous, occupying the whole right upper lobe. One of the medical officers said he thought there was no such thing as *pure famine oedema*."[72] The construction of diverse medical categories both animated discussions among the scientific community and raised contention about the causal and developing mechanisms of hunger.[73]

The projection of the medical eye onto hunger created multiple classifications and more specific conditions, while also differentiating these categories in specific stages. Medical professionals in Leningrad distinguished the disease dystrophy in stages.[74] The Jewish doctors in Warsaw created classifications like the "three degrees of emaciation."[75] Dr. Magee from the British Ministry of Health segmented different diets and types of care for the starving based on categorizing hunger into mild, intermediate and severe cases.[76] The medical team in the 1942 nutritional study of the French camps in Nimes determined the priority and type of "treatment" according to a classification into "cachectic, precachectic, threatened and normal."[77] In Belsen, to facilitate the implementation of relief responses, a selection process segregated inmates according to

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[71] Manley, "Nutritional Dystrophy," quote on 224, also, 213, 217.
[72] Alex Paton, "Mission to Belsen 1945," *British Medical Journal* 283, no. 6307 (1981): 1658, my emphasis.
[73] Ancel Keys et al., "Famine Edema and the Mechanism of Its Formation," 669; Nutrition Reviews, "Hunger Edema in Children," 281; Zimmer, Weill, and Dubois, "The Nutritional Situation in the Camps," 309.
[74] Manley, "Nutritional Dystrophy," 224.
[75] Fliederbaum, "Clinical Aspects of Hunger Disease in Adults," 15-16, 18, 20; Braude-Heller, Rotbalsam, and Elbinger, "Clinical Aspects of Hunger Disease in Children," 52-54.
[76] Magee, "Some Effects of Inanition and their Treatment," 56-57.
[77] Zimmer, Weill, and Dubois, "The Nutritional Situation in the Camps," quote on 306, also 304-305.

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their state's severity through triage methods.[78] In a study conducted by Bose, from the Calcutta School of Tropical Medicine, with starving individuals during the Bengal famine of 1943, the primary rationale was also grounded on medical examinations and classifications. The researcher clinically catalogued cases into those suffering from acute starvation (without being previously malnourished) and cases of chronic malnutrition, usually with the presence of concurrent diseases. This clinical division was substantiated by biochemical tests of blood-sugar levels, serum protein content, and various blood markers such as creatinine, cholesterol, and calcium.[79] A scientific preoccupation with categorizing and distinguishing the degrees of starvation would then breed a concern for enacting effective diagnosis and differentiating nutritional protocols to manage hunger.

2.5 Localizing and Medicalizing the Starving's Debilities

The medical scrutiny into the starving body ignited scientific interest in specific physiological mechanisms considered crucial to the course of hunger and to the body's rehabilitation. Experts devoted particular attention to the digestive and absorptive functions of the body, looking to research that commenced decades before the Second World War. In the beginning of the 1920s, a series of scientific studies explored the effects of fasting on the absorptive capacities of animals' alimentary canals.[80] Dr. Hugh Edwards Magee was one expert who took great interest in this subject. A Bachelor of Medicine and Doctor of Science, Magee served on the British Army Medical Corps and

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[78] Ben Shephard, *After Daybreak. The Liberation of Belsen 1945* (London: Jonathan Cape, 2005), 50, 52, 57-58.
[79] J. P. Bose, "Malnutrition in Bengal," *The Indian Medical Gazette* 81, no. 12 (1946): 542-544.
[80] H. E. Magee, "The Rôle of the Small Intestine in Nutrition," *Physiological Reviews* 10, no. 3 (1930): 499-500; H. E. Magee, "Starvation and Protein Hydrolysates. Physiological Considerations," in *Discussion: The Physiology and Treatment of Starvation*, President Dr. Geoffrey Evans, *Proceedings of the Royal Society of Medicine* 38, no. 7 (1945): 388-389.

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Indian Medical Service, worked at the esteemed Rowett Research Institute along the interwar, and later came to be a senior medical officer of nutrition of the British Ministry of Health.[81] In 1930, assembling a literature review of many of these studies in animals, Dr. Magee drew uncertain deductions: "[…] a finding that *might be attributed* to impaired digestion or absorption or both. *It is probable* that absorption was principally affected."[82] From this literature review, he concluded on conjectural grounds and extrapolated these scientific hypothesis: "Although it is very desirable that these experiments should be repeated, they are nevertheless *very suggestive* that the epithelium is the first to suffer in undernutrition […] the occurrence of *degeneration of the gastro-intestinal mucosa in animals* fed on deficient diets suggests the application of a similar *modus operandi* to conditions of malnutrition."[83] Alongside the development of these studies, however, scientists remarked on the "indefinite" knowledge of the physiological workings of plain muscle, of which stomach and intestinal are examples.[84] This shows how, in the first decades of the twentieth century, knowledge of the digestive and absorptive functions of the gastrointestinal tract was still embryonic and mainly based on animals' experiments.

In a 1945 conference of the Royal Society of Medicine, Dr. Magee reviewed fasting experiments in cats, rats, white mice, and fowls, from the 1920s to the 1940s, and

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[81] H.E. Magee, "Nutrition Lessons of the Berlin Blockade," *Public Health Reports* 67, no. 7 (1952): 622; "Dr Magee Hugh Edward," Our Family History: Parish/Thomas and Associated Families, last modified November 17, 2016, accessed October 18, 2018, http://parish-family.co.uk/getperson.php?personID=I24588&tree=Parish#cite2.
[82] Magee, "The Rôle of the Small Intestine in Nutrition," 499, my emphasis.
[83] Ibid, 499-500, my emphasis (note that *modus operandi* is italicized as a Latin word, which can be found in the original article).
[84] Lovatt C. Evans, "The Physiology of Plain Muscle," *Physiological Reviews* 6, no. 2 (1926): quote on 358; H. E. Magee and C. Reid, "Studies on the Movements of the Alimentary Canal: I. The Effects of Electrolytes on the Rhythmical Contractions of the Isolated Mammalian Intestine," *The Journal of Physiology* 63, no. 2 (1927): 97.

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even in a human study conducted in 1943. This enabled him to more decisively assert that "deprivation of food progressively destroys the digestive, absorptive and protective functions of the alimentary canal and also, *it would seem*, impairs the metabolic function."[85] In the same occasion, Dr. Magee conjectured, "Contractions of the intestinal villi are believed to play some part in absorption but *what it is precisely has not yet been discovered*."[86] If this area of study appears to have been highlighted amid the prominent concern for starvation in the 1940s, we note how medical knowledge of the body's absorptive mechanisms was still incipient.

Even as the knowledge of digestive and absorptive functions was in development, it acquired predominance in explaining the course of hunger in the postwar. Dr. Magee expounded on the physiological changes inflicted by hunger to argue that, "Failure of absorption seems to me to be the essential lesion in starvation."[87] He medicalized the condition by identifying a specific physiological malfunction, transforming and internalizing the key problem of hunger as the inability to absorb food. Further, he viewed the medical objective as the "restoration of the structure and of the function of the intestinal epithelium," which highlighted the need for specific solutions that could rehabilitate the body's functions. In this way, his logical scientific response argued that, "Since *this cannot be done* by giving food by mouth, *suitable* "building stones" in *appropriate amounts must be given by vein*."[88] Researchers from the All-India Institute of Hygiene and Public Health provided the clear-cut recommendation that, "Protein food may be administered by mouth, but it will need to be digested and absorbed by the

[85] Magee, "Starvation and Protein Hydrolysates," quote on 389, also 388, my emphasis.
[86] Ibid, 388, my emphasis.
[87] Magee, "Starvation and Protein Hydrolysates," 388.
[88] Ibid, 389, my emphasis.

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gastro-intestinal tract. In advanced cases of starvation, *because of impairment of digestive function, this is often not possible*."[89] In this way, medicine's internal gaze bolstered the assumption that the starving body was unable to adequately digest and absorb whole nutrients in the form of food.

The conception of the starving's digestive impairment came, in turn, to influence the management of hunger, particularly by propelling technical responses. Dr. Magee suggested that the "impaired digestion [of intermediate cases of starvation] requires pepsin and hydrochloric acid; stimulants such as strychnine may also be required."[90] The researchers from the All-India Institute of Hygiene and Public Health advised that in face of debilitated digestive functions, "the only other alternative then is to administer hydrolyzed proteins parenterally."[91] When the digestive or absorptive capacity of the starving seemed to be impaired, Magee also highlighted the probable benefit of providing protein hydrolysates.[92] Dr. Cuthbertson from the British Medical Research Council pointed out that given the scientific uncertainty of the superior benefit of pre-digested over whole nutrients, "It is therefore *only when the patient's capacity to ingest, digest or absorb is seriously affected* that the *administration of hydrolysates by vein is indicated*."[93] Within this paradigm, medico-scientific knowledge, by identifying an internal deterioration that demanded medical techniques for detection, was elevated as the arbiter of assessing hunger's severity, and prescribing the necessary response. Medical

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[89] K. V. Krishnan, E. K. Narayanan, and G. Sankaran, "Protein Hydrolysates in the Treatment of Inanition," *The Indian Medical Gazette* 79, no. 4 (1944): 161, my emphasis.
[90] Magee, "Some Effects of Inanition and their Treatment," 56.
[91] Krishnan, Narayanan, and Sankaran, "Protein Hydrolysates in the Treatment of Inanition," 161.
[92] Magee, "Some Effects of Inanition and their Treatment," 57.
[93] D. P. Cuthbertson, "Medical Research Council," in *Discussion: The Physiology and Treatment of Starvation*, President Dr. Geoffrey Evans, *Proceedings of the Royal Society of Medicine* 38, no. 7 (1945): quote on 391, my emphasis, also 392.

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knowledge on the debilitated state of the starving body also made the use of protein hydrolysates more compelling. Impelled by the knowledge of impaired digestion, protein hydrolysates attained a special allure around their scientific adequacy for the management of hunger.

2.6 Evaluating the Appropriate Responses to Hunger

One of the outcomes of these scientific inquiries and medical scrutiny into hunger were the discussions of the ideal composition and quantities of food necessary for the management of hunger. The starving's physiological debilities fueled conceptions that relief diets should be specifically suited to the hunger stage at stake and needed to include "maximum nutritional value with the minimum of bulk."[94] There was, therefore, a growing preoccupation with finding the precise quantifications of nutrient requirements for devising efficient diets for starvation.[95] Dr. Magee warned that the degree of medical caution should accentuate as the severity of starvation worsened, such that, "Mild cases respond rapidly to easily digested food," while intermediate cases, "should be fed very cautiously on milk and dairy products, avoiding excess of fat."[96] In spite of these dietary stratifications, all stages demanded attention to the quantities of food, which initially needed to be small and changed according to medical progress.[97] The attention to the needs and abilities of starving bodies indicates a calculative and scientific view of food

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[94] Bose, "Malnutrition in Bengal," 545.
[95] Elman's study of the starving body's nutrient needs provides an emblematic example of this relentless scientific search: "*What, actually, is the minimum amount of carbohydrate which is necessary in order to prevent ketosis and to insure adequate utilization of the ingested nitrogenous food? If this were known, starvation could be prevented with a relatively restricted diet* without producing physiologic impairment. The minimum requirements then would *consist merely of sufficient food to maintain water, electrolyte, nitrogen and vitamin balance*." Robert Elman, "Acute Starvation Following Operation or Injury: With Special Reference to Caloric and Protein Needs," *Annals of Surgery* 120, no. 3 (1944): 357, my emphasis.
[96] Magee, "Some Effects of Inanition and their Treatment," 56.
[97] Ibid, 56-57.

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and physiologic requirements, concerned with assembling nutrients, and determining quantities and the regularity of intake. The examples below also shed light into how technical solutions and food blended in responses to hunger.

The All-India Institute of Hygiene and Public Health's experience in Calcutta in late 1943 delineated a specific, yet simplified, "dietetic treatment." The cases of inanition and their responses were segmented according to the case's severity and the individual's physiological abilities. For cases the medical team considered as collapsed, the Committee of Enquiry into Effects of Starvation suggested a solution of protein hydrolysates, glucose and vitamins, supplemented by fluid diets that should be administered through intravenous or nasal application techniques. The Committee recommended the use of fluid diets (such as flour, water, sugar, salt, shark liver oil and yeast), fruit drinks or milk recipes, according to the gradations of starvation's severity. For cases that could sustain the ingestion of food, the report advised a gruel diet of dhal, cereal mixture, vegetables, salt, and condiments, with added sugar depending on palate preference.[98]

Bose, from the Calcutta School of Tropical Medicine, recommended a "dietetic treatment" in line with the All-India Institute of Hygiene and Public Health's case-specific segmentations. Severe cases of starvation required intravenous protein hydrolysates with glucose and vitamin B. Those very weak demanded fluid diets of "skimmed milk, *ghol*, glucose, [and] fruit juice;" and "thin *conjee* made with milk, sooji and water and thin gruel prepared with dal, rice and vegetables, salts, condiments, etc,"

[98] Committee of Enquiry into Effects of Starvation, Indian Research Fund Association, "Treatment and Management of Starving Sick Destitutes," *Indian Medical Gazette* 79, no. 2 (1944): 75-78.

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were for the ones recovering well.[99] Conjee, a typical Asian dish, consists of a porridge or gruel usually made with rice. Sooji refers to semolina, purified from durum wheat. Dahl relates to split pulses, such as split peas, lentils, and beans, or to soups and gruels made from pulses. From the use of these local ingredients and locally-acquainted dishes, we note how these prescriptions were designed with the population's way of life in mind. Alongside the allure of scientific concoctions, hunger relief was at times permeated with a concern for locally-sourced and acceptable responses. Further, medical researchers in Calcutta devised the Bengal Famine Mixture, a porridge-like blend of dried milk, flour, sugar, salt, and water for the extremely weak starving still deemed able of deglutition, meaning they still had the ability to swallow and absorb food.[100] From these recommendations, we note a medical segmentation and classification of starvation cases, the use of more technologized solutions in severe starvation, carefully calculated and composed recipes, and their regard as "hospital diets," reinforcing the medical control over the nutritional response. Taken by the delicate physiological state of the starving, Dr. Magee likewise suggested that "treatment" for mild, intermediate and severe cases should occur under hospital supervision.[101]

Scientific research in Leningrad also upheld the need for the precise types of food, calculation of amounts and frequency of feeding. Doctors would stipulate each of these aspects according to the degree of hunger.[102] In Belsen, nutritional experts provided advice and systematized the distribution of appropriate diets, at a time of incipient scientific discussions in Britain around the adequate amounts of macronutrients for the

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[99] Bose, "Malnutrition in Bengal," 545-546, original emphasis.
[100] Shephard, *After Daybreak*, 98-99.
[101] Magee, "Some Effects of Inanition and their Treatment," 55-57.
[102] Manley, "Nutritional Dystrophy," 231-232, 250.

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management of starvation.[103] The nutritional experts devised a meticulous and stratified diet, which essentially looked to food as the nutritional response:

> *Extreme starvation cases* were to be given *milk, sugar and vitamin tablets*; cases requiring a light diet got separated milk and sugar, plus small amounts of bread, tinned meat and vegetables, potatoes, butter, soup and (when available) egg; while *those able to eat ordinary meals* got a daily intake of 2300 calories and a liberal allowance of animal protein and lots of bread and potatoes.[104]

In Western Holland, the relief authorities, considering scientific studies that claimed the digestive impairments of the starving body, planned a series of feeding regimens with different quantities and concentrations of protein hydrolysates with glucose-vitamin solutions, and food diets of different composition and calorie content. A preliminary report showed that the chosen "scheme of treatment" was to segment those incapable of swallowing from those able to ingest. The first group received a high-concentration protein hydrolysates and glucose mixture or "concentrated liquid food" (such as milk and glucose) via a feeding tube. For the latter, the dietary prescription included protein and carbohydrate-rich foods, mainly consisting of skim-milk powder, and including oatmeal, rice flour, vegetables, fruit, glucose, bread, meat, cheese, egg, jam and butter.[105]

From all the examples above, I argue that responses to hunger as a whole came to be conceived not as relief, but as treatment. Even those who championed the use of food, conceived of it as needing to be administered by medical personnel in a controlled setting, according to specific medical conceptions of the starving's abilities. We have seen how the beginning of the twentieth century ushered in the preeminent view and use of calories as a quantifiable tool of statecraft. Amid the medicalization of hunger, I argue

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[103] Shephard, *After Daybreak*, 80-81.
[104] Ibid, 81, my emphasis.
[105] G. C. E. Burger, H. R. Sandstead, and Jack Drummond, "Starvation in Western Holland: 1945," *The Lancet* 246, no. 6366 (1945): 282-283.

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that calories were not just a political instrument, but assumed particular medical contours. The scientific establishment came to conceive of calories, nutrients, and food as a form of treatment. Any solution to hunger, whether technical or not, had to be carefully measured, adequately administered, and appropriately composed. The treatment dimension is further augmented by another aspect we will now discuss: an integration of the management of hunger with the care of other diseases and conditions.

2.7 Inscribing Relief in a Medical Framework

The preparation of relief during the Second World War and the operations that followed emphasized the need to manage both starvation and infectious diseases, from typhus to venereal diseases.[106] This larger scenario contributed to a postwar management of hunger that was both integrated with medical responses and subsumed in a medical framework. The British response to the liberation and management of the Belsen concentration camp, for example, sheds light into how this humanitarian crisis was approached through the lenses of medical relief.[107] As Weindling notes, from the initial measures of containment to the arrangements for migration, the response to Belsen was geared to medical and sanitary control.[108] A medical gathering summoned by the UNRRA in 1946 advocated for the assembling of "flying squads" that would promote active searches for the most vulnerable during famines and transport them to "treatment." It also suggested the organization of medical inspecting teams and the expansion of

[106] Reinisch, "Introduction," 374, 390.
[107] Shephard, *After Daybreak*, 4-5, 195.
[108] Paul Weindling, "'Belsenitis': Liberating Belsen, Its Hospitals, UNRRA, and Selection for Re-emigration, 1945–1948," *Science in Context* 19, no. 3 (2006): 401-403.

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outpatient medical care that would tend to hunger edema.[109] As these examples suggest, underscored by a military logic that guided postwar rehabilitation, the medicalization of hunger permeated the postwar relief effort as a whole, not only restricted to assessments of and responses to hunger.

The medical scrutiny into hunger also led to more specific responses, targeted to the deficiencies identified. In this way, the management of hunger acquired greater medical contours, being integrated to the treatment of infirmities that were a consequence of or were aggravated by starvation.[110] Even for "intermediate cases," Dr. Magee suggested that, "Diuretics should be given for oedema."[111] He further advised the need for heightened medical attention and monitoring of severe cases, with care encompassing the use of "pepsin and hydrochloric acid, and stimulants when required. Frequent intravenous injections of glucose should be given. Opium and potassium permanganate are useful for the diarrhoea."[112]

A report by the All-India Institute of Hygiene and Public Health assembled a list of essential drugs and medical tools based on the experience of caring for cases of "pure" starvation, starvation and disease, and acute maladies, in Calcutta towards the end of 1943. Among the general recommended list especially intended to orient emergency medical facilities being set up in Bengal in 1944 to assist "starving sick destitutes," we note quinine for countering malaria, M&B 693 for pneumonia cases, ferrous sulphate for

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[109] "To Guard Against Famine," *The Lancet* 247, no. 6408 (1946): 938.
[110] Some examples can be seen in: The Lancet, "To Guard Against Famine," 938; John Lowe, and H. Chakravarty, "Famine Oedema and Its Treatment with Mercurial Diuretics," *Indian Medical Gazette* 80, no. 4 (1945): 209; Burger, Sandstead, and Drummond, "Starvation in Western Holland: 1945," 283; Committee of Enquiry into Effects of Starvation, "Treatment and Management of Starving Sick Destitutes," 79-81; Krishnan, Narayanan, and Sankaran, "Protein Hydrolysates in the Treatment of Inanition," 162.
[111] Magee, "Some Effects of Inanition and their Treatment," 56.
[112] Ibid, 57.

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relieving anaemia, and various drugs, such as unguentum sulphuris and magnesium sulphate, for skin lesions. Even as these recommendations designed "diet treatments" to target the management of inanition, the responses for starvation and diseases blended in medico-pharmaceutical regimes under medical control.[113] In the relief to Western Holland, such therapeutic integration can also be noted in a *Nutrition Reviews* article: "Diarrhea was treated with *kaolin, opium, or sulfonamides*. Plasma and whole blood transfusions were not particularly helpful in collapse. *Digitalis and mercurial diuretics* helped in heart failure but did not affect hunger edema […] Persistent hypotension was ameliorated by *use of adrenal cortical extract* […] *Niacin* seemed to reduce dermal pigmentation and *niacinamide* relieved the painful red tongue which was a frequent sequel to diarrhea."[114] On the other hand, the study based on Danes interned in German concentration camps, while firmly employing a medical view of "famine disease," countered the main literature that favored the use of pharmaceutic substances for acting on "special symptoms," such as hunger diarrhea, edema, polyuria and anemia. The authors, instead, dismissed the need for "specific treatment" by arguing for the sufficiency and greater safety of "dietetic treatment."[115] Even if a general medicalized framework encompassed the management of hunger, there was no scientific consensus on how to view conditions present during starvation – if as accompanying diseases or symptoms of hunger – and how to care for them.

The integration of pharmaceutical substances into therapeutic regimens indicated an augmentation in the medical character and control over conceptualizing and

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[113] Committee of Enquiry into Effects of Starvation, "Treatment and Management of Starving Sick Destitutes," 74-75, 79-81.
[114] Nutrition Reviews, "Starvation: 1945," 29, my emphasis.
[115] Acta Psychiatrica Scandinavica, "Treatment of Famine Disease," 261-262.

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responding to hunger. More importantly, it shed light into how hunger relief mutated into treatment, from the larger inscription of relief into a medical framework, to the medical assessment and stipulation of responses, use of pharmaceutical compounds, and regard of management schemes as treatment. We also note from the cases above the developing conception that ordinary food was insufficient to care for acute cases of starvation in the post-World War II, even as there were plural conceptions of what constituted the best way to manage hunger. This highlights the prevailing idea amongst nutrition circles that thought it possible to design a precisely adequate response to hunger based on scientific knowledge and sought to consolidate these techniques in a standardized protocol. At the same time, this confidence in science resulted not only in techno-scientific solutions, but also delineated the value of food, when properly calculated and formulated. We will now further explore how the deployment of technically-engineered solutions and food combined in the postwar management of hunger.

2.8 An Encounter of Technical and Ordinary Solutions to Hunger

2.8.1 A Scientific Breakthrough? The Development and Trials of Protein Hydrolysates

In 1938, two doctors from an American university performed the first intravenous injections of protein hydrolysates in humans.[116] In these original clinical trials, protein hydrolysates of casein were administered to eight cases: one bacterial infection of the blood, one upper respiratory tract infection, one kidney disease, one carcinoma of the esophagus, two carcinomas of the stomach, and two intestinal obstructions. We note that these researchers initially devised protein hydrolysates to be used under hospital

[116] A. B Anderson, "The Therapeutic Use of Protein Hydrolysates," *Proceedings of the Nutrition Society* 4, no. 3-4 (1946): 237; Robert Elman and D. O. Weiner, "Intravenous Alimentation with Special Reference to Protein (Amino Acid) Metabolism," *Journal of the American Medical Association* 112, no. 9 (1939): 798.

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situations in which there were "defective" digestive and absorptive functions and/or oral feeding was not recommended, with the first trial cases supporting this intention. They also highlighted that nutritional edema was a strong indication for intravenous protein feeding, though essentially referring to cases where protein deficiency and edema derived from concurrent diseases or medical procedures. This research concluded that clinical and histological examinations did not find protein hydrolysates to produce toxic reactions, and nitrogen balance, serum protein and clinical analyses allowed the observation of hydrolysates' favorable impact in relieving the patients' conditions.[117] With these initial beneficial results, starvation seemed to present an ideal case for the use of protein hydrolysates. The Bengal famine of 1943 provided an urgent and experimental context from which the first reports on the use of protein hydrolysates in the management of starvation emanated.[118]

In 1943, Indian researchers from the All-India Institute of Hygiene and Public Health tested various techniques for managing advanced starvation. Without discussing the causes of famine, these scientists were preoccupied with the growing number of "starving destitutes" in the streets of Calcutta in 1943.[119] The recurring characterization of the starving as "destitutes" resonates with the anxieties surrounding British famine camps in the late nineteenth-century India. The portrayal of the starving in colonial India as "prostrate, agentless, and discursively stripped of intellect or volition," has moved across centuries and has continued to inform conceptions of the hungry.[120] The

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[117] Elman and Weiner, "Intravenous Alimentation," 797, 800-802.
[118] Anderson, "The Therapeutic Use of Protein Hydrolysates," 239.
[119] Krishnan, Narayanan, and Sankaran, "Protein Hydrolysates in the Treatment of Inanition," 160.
[120] Aidan Forth, *Barbed-Wire Imperialism: Britain's Empire of Camps, 1876-1903* (California: University of California Press, 2017), quote on p. 50; also, p. 44.

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"collapsed cases" of starvation were transferred to emergency hospitals, which did not have at the time a clear regimen for managing acute starvation. Initial attempts used intravenous applications of glucose saline and blood serum. Inspired by the work of US doctors on protein hydrolysates, researchers in the Institute decided to investigate the response to the theoretically-sound protein hydrolysates with a mixture previously tried only in animal experiments. They designed their own formula of papain digests of meat, with added glucose and sodium chloride, chosen for its cost-efficiency, obtained through an elaborate method of preparation that required attention to sterilization and passed through biological, bacteriological, and immunological tests.[121] The Institute analyzed around 1,000 cases with 3,000 protein hydrolysates injections, and concluded that the solutions were "well tolerated" and produced improvements on the starving organism. Such improvement was measured on the basis of a medico-scientific view that evaluated the reaction of biological processes in the body to protein hydrolysates' administration. Though the study noted that some cases mildly responded to protein hydrolysates therapy and later died, autopsies accounted for the presence of complications, like malaria or dysentery.[122] The researchers' final scientific opinion was, therefore, that "with the use of this form of treatment *a number of deaths in hospitals caused by inanition alone* can be considerably reduced."[123] Using scientific rationalization, vague and limited notions of efficacy to legitimize protein hydrolysates, and carving specific medical boundaries for their utilization, the prevailing belief in the need for a therapeutic solution trumped consideration for alternative solutions of, perhaps, just food.

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[121] Papain is a "vegetable proteolytic enzyme […] readily available in large quantities at a low cost." Krishnan, Narayanan, and Sankaran, "Protein Hydrolysates in the Treatment of Inanition," 161.
[122] Ibid, 160-162.
[123] Ibid, 162, my emphasis.

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The All-India Institute of Hygiene and Public Health attests to how scientific knowledge was part of an international network. Arnold points to how Indian science, from the interwar period, had an increasingly international character, if still firmly entrenched within the colonial medical establishment.[124] The Rockefeller Foundation funded the initial construction and equipping of the Institute, inaugurated in 1932.[125] Through collaboration with the WHO and the United Nations Children's Fund (Unicef), the Institute's accreditation as an International Training Center in 1953 further centered it as a locus of knowledge exchange and capacity building, especially in South East Asia.[126] From its inception, the Institute had a section devoted to biochemistry and nutrition.[127] Krishnan, one of the authors of the study on the use of protein hydrolysates in cases of advanced starvation, was head of the Department of Microbiology in the All-India Institute of Hygiene and Public Health.[128] The Institute epitomized how various responses to hunger were being forged in multiple sites, influenced by the international circulation of medical knowledge, and how nutrition was simultaneously approached through multi-disciplinary scientific lenses.

The Bengal famine thus provided an experimental arena to test protein hydrolysates, and nutrition experts hailed these initial results as miraculous.[129] *The Lancet* reported that protein hydrolysates, when tested during the Bengal famine, showed

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[124] David Arnold, *Science, Technology and Medicine in Colonial India*, The New Cambridge History of India (Cambridge: Cambridge University Press, 2000), 194.
[125] "All-India Institute of Hygiene and Public Health: Gift of the Rockefeller Foundation," *The British Medical Journal* 1, no. 3664 (1931): 546; "History," All-India Institute of Hygiene and Public Health, accessed October 9, 2018, http://aiihph.gov.in/history/.
[126] "History," All-India Institute of Hygiene and Public Health, accessed October 9, 2018, http://aiihph.gov.in/history/.
[127] The British Medical Journal, "All-India Institute of Hygiene and Public Health," 546
[128] "Department of Microbiology," All-India Institute of Hygiene and Public Health, accessed October 9, 2018, http://aiihph.gov.in/department-of-microbiology/.
[129] James Vernon, *Hunger: A Modern History* (Cambridge: Belknap Press of Harvard University Press, 2007), 148-149.

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promising results of reviving the once-thought hopeless cases. Mixed with glucose, the administration of these pre-digested proteins yielded a mortality rate of only 8% in uncomplicated cases, while control groups injected with glucose-saline solutions had a 67% mortality ratio.[130] We note how the success rate of protein hydrolysates was measured with a glucose-saline solution as the comparing standard, instead of attempts with food mixtures. The presumed efficacy sparked interest in Britain in employing the concoction in the relief of northwestern Europe. The British Medical Research Council prompted British pharmaceutical companies to increase the production of protein hydrolysates.[131] In European relief, protein hydrolysates would also follow as an experimental attempt. In Belsen, the emergency feeding plan was primarily regarded as a scientific experiment in novel nutritional compounds that could be especially useful in face of the anticipated release of British personnel confined in Japanese prisoner of war camps.[132] Indeed, Alex Paton, one of the medical students deployed to Belsen, recalled that their mission was to apply a "relatively new and experimental" feeding method "by spoon or through the nose [of] a solution containing casein hydrolysate (2.5%), carbohydrates (7.5%), and vitamins B and C for the first three days," and thoroughly document its use.[133] We can also glean insight into the experimental aspect of the endeavor in Paton's account of assisting in "research on starvation" through autopsies.[134]

The use of protein hydrolysates had a terrible outcome in Belsen. The usual administration via intravenous or nasal routes brought back intolerable memories to

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[130] "Partial Starvation and its Treatment," *The Lancet* 245, no. 6343 (1945): 376.
[131] Shephard, *After Daybreak*, 98-99.
[132] Weindling, "'Belsenitis'," 407-408.
[133] Paton, "Mission to Belsen 1945," 1656.
[134] Ibid, 1658.

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Belsen inmates and oral applications were also refused given its repulsive taste and smell. Moreover, protein hydrolysates did not deliver the expected positive results and even resulted in death.[135] Conversely, besides offering easy administration, versatility for mixtures, and producing beneficial results, milk was well-received by Belsen inmates.[136] As a counterpoint to the scientific scrutiny of identifying the starving body's debilities and devising elaborate techniques for its response, in Belsen, "Experience showed that the majority of patients, *however bad*, were *both able and anxious* to take fluids by mouth."[137] In Western Holland, protein hydrolysates also produced ill results and, when there was the possibility of consuming food, it brought the best effects. Food also resolved anemia instead of attempts at providing specific solutions such as vitamins, liver extract and iron. Further, in cases where glucose and hydrolysates preparations were administered through feeding tubes, "equally good results were obtained with unhydrolyzed proteins."[138] Additionally, it was soon concluded that the aid operation to the Western Netherlands was founded on faulty premises that the starving were incapable of deglutition and digestion.[139] The US Committee on Therapeutic Nutrition, when advising the Medical Research and Development Board of the Department of Defense, discouraged the use of protein hydrolysates and indiscriminate intravenous alimentation in diet therapy. With basis on World War II experience, the report attested to hydrolysates' inefficacy and danger, and to the harms of intravenous feeding to the

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[135] Shephard, *After Daybreak*, 100-101.
[136] Vaughan, Dent, and Pitt Rivers, "The Value of Hydrolysates in the Treatment of Severe Starvation," 396-397.
[137] Vaughan, Dent, and Pitt Rivers, "The Value of Hydrolysates in the Treatment of Severe Starvation," 397, my emphasis.
[138] Nutrition Reviews, "Starvation: 1945," 29.
[139] The Lancet, "Famine and Malnutrition in Europe," 513.

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starving's impaired circulatory system.[140] The study argued that protein hydrolysates were generally unsavory, costly, sometimes induced side effects, and were not nutritionally superior to whole proteins. Again evidencing the medical focus on physiological processes, the study restricted the application of protein hydrolysates to individuals with digestive diseases.[141]

In spite of the adverse results of protein hydrolysates in postwar hunger relief, an interest in technical solutions to hunger remained alive. Some nutritional experts argued that the disappointing trials of protein hydrolysates in European relief were mainly a result of their "unpleasant taste": "More palatable preparations might have given better results."[142] Even with the failure of protein hydrolysates, their administration in Belsen continued, while it became more evident for the medical personnel that the best response consisted in regular small oral intakes of food.[143] Doctors Vaughan, Dent, and biochemist Pitt Rivers formed part of the British Medical Research Council's team of nutritional relief in Belsen. Even while conceding from their experience in Belsen the negative results of protein hydrolysates and the "extremely satisfactory" effects of skimmed milk, they noted that, "a peculiar type of patient was being treated, one who had been starved, dehydrated and possibly tortured for a long period, who suffered from many intercurrent infections and profoundly unhygienic living conditions. *Hydrolysates may well prove more successful under different circumstances*."[144]

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[140] Herbert Pollack, and Seymour Lionel Halpern, "Therapeutic Nutrition: With Special Reference to Military Situations," A Report of the Committee on Therapeutic Nutrition, Food and Nutrition Board, National Research Council. January 1951, vii-ix, 54.
[141] Ibid, 11.
[142] Anderson, "The Therapeutic Use of Protein Hydrolysates," quote on 240, also 239.
[143] Shephard, *After Daybreak*, 100-101.
[144] Vaughan, Dent, and Pitt Rivers, "The Value of Hydrolysates in the Treatment of Severe Starvation," quote on 397, my emphasis, also 395.

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Even with contentions around the need for specific technologized solutions, a scientific conviction further fueled trials of various substances in the management of hunger. This scientific conviction was advanced by the medical identification of hunger's pathological processes, which meshed with a faith in scientific expertise to recuperate the starving body through specific therapies. The intricate scientific observations, though painting the complex and severe situation, reaffirmed science's potential to counter the body's degeneration. In *The Lancet* review of Sir Jack Drummond's analysis of the famine situation in Europe, "Death from starvation comes suddenly, *after reduction of the blood-sugar to vanishing-point*; but many who are near death *can be revived by prompt treatment*."[145] In the study based on Danes interned in German concentration camps, the authors optimistically proclaimed that "rational and careful treatment" yielded the possibility to "[…] *cure* even cases which appeared to be quite hopeless. In the light of our present knowledge it would appear that *all the lesions of the organism* which are a direct consequence of inanition are *completely reversible*."[146] Here, we note a reliance on scientific knowledge and the belief that the pathophysiology of hunger could be identified and resolved by medicine.

In this scientific light, the development of protein hydrolysates was considered a turning point for managing acute cases of starvation, a possibility to recuperate those thought as lost.[147] Protein hydrolysates embodied a scientific promise that technologized preparations would solve hunger. Evidencing the confidence around science's potential to craft cure-all solutions, a doctor enthusiastically speculated that protein hydrolysates

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[145] The Lancet, "Famine and Malnutrition in Europe," 513, my emphasis.
[146] Acta Psychiatrica Scandinavica, "Treatment of Famine Disease," 261.
[147] The Lancet, "Partial Starvation and its Treatment," 376.

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could be a possible "panacea for all ills!"[148] These views allow us to understand the appeal and continuous use of technical solutions, even with the negative outcome of protein hydrolysates. A study of hunger edema during the Bengal famine presented evidence that some acute cases, when non-responsive to the provision of high-protein diets, protein injections, or vitamin preparations, reacted remarkably well to the administration of mercurial diuretics.[149] Other scientific articles published around the same time period, however, warned against their use.[150] In Belsen, the administration of blood serum or plasma showed better results than protein hydrolysates.[151] As a last resort to feeding or in specific physiological states, the US Committee on Therapeutic Nutrition recognized parenteral alimentation of whole blood, plasma, human serum albumin, erythrocytes (red blood cells), and protein hydrolysates as a means to supply the necessary proteins for rehabilitation.[152] The study of Danes held in German internment camps also recognized the therapeutic availability of intravenous plasma, serum, whole blood or synthetic protein solutions, but, given diverse risks, subjected their use to careful medical judgment and necessity.[153]

2.8.2 Mixing Food and Medical Expertise

The medicalization of hunger, persistent faith in science, and the acknowledgement of food's value allows us to observe how food and techno-scientific

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[148] Hugh Stannus, "Discussion: The Physiology and Treatment of Starvation," President Dr. Geoffrey Evans, *Proceedings of the Royal Society of Medicine* 38, no. 7 (1945): 393.
[149] Lowe and Chakravarty, "Famine Oedema and Its Treatment with Mercurial Diuretics," 209-210.
[150] The Lancet, "Partial Starvation and its Treatment," 375-376; Magee, "Some Effects of Inanition and their Treatment," 56.
[151] Vaughan, Dent, and Pitt Rivers, "The Value of Hydrolysates in the Treatment of Severe Starvation," 396-397.
[152] Pollack and Halpern, "Therapeutic Nutrition," 12-14.
[153] Acta Psychiatrica Scandinavica, "Treatment of Famine Disease," 256-258.

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solutions were mixed in nutritional recommendations and relief action. We have already seen in the section on the appropriate responses to hunger some examples of the segmentation of diets and combination of pharmaceutical and food elements. I now turn to examining this phenomenon in more detail.

Alongside attempts at employing technically-engineered solutions in the management of hunger, experiences showed the value of food in relieving hunger. British Brigadier Stevenson invoked the Bulletin of War Medicine to recommend that relief for starving populations "should be by good mixed diet alone - not too high in protein, and containing, so far as possible, all the accessory food factors."[154] Zimmer, Weill, and Dubois, in spite of their highly medical frame on hunger, advocated for the regular provision of food rations as the central pillar in combatting starvation.[155] Even an article in *The Lancet* that hailed the promise of protein hydrolysates reminded that post-World War II relief should not be principally based on them, since liberated countries essentially needed food.[156] Further, amidst the medicalization of hunger, ordinary food itself became a treatment. An investigation during the Bengal famine concluded that the "rational form of treatment" for hunger edema seemed to be through diets, especially of high-protein content.[157] Studies on Danes in German internment camps demonstrated, for example, that the majority of starvation cases could be managed by a "dietetic treatment" consisting in the oral consumption of preferably "genuine protein" over "synthetic derivatives." In this way, this study advised the provision of a glucose and skimmed milk

[154] Douglas S. Stevenson, "Famine Oedema in Prisoners of War," *British Medical Journal* 1, no. 4349 (1944): 659.
[155] Zimmer, Weill, and Dubois, "The Nutritional Situation in the Camps," 314.
[156] The Lancet, "Partial Starvation and its Treatment," 376.
[157] Lowe and Chakravarty, "Famine Oedema and Its Treatment with Mercurial Diuretics," 209.

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powder solution in regular and small quantities until the introduction of a "varied protective diet."[158] Even if favoring food in the management of hunger, these approaches shared the prevalent reductionist medico-scientific view of hunger and nutrition.

The provision of food for managing hunger meshed with techno-scientific solutions, both in planning discussions and in practical relief. The health division of the UNRRA held a medical meeting on May 1946, and deliberated that: "The treatment of starving patients requires an adequate supply of spray-dried *skimmed-milk powder, dried eggs, prepared cereals, glucose (preferably fortified with vitamins),* fats, fruit juices, and flavouring agents […] protein-rich products such as prepared yeast, soya, dried liver powder, *protein hydrolysate* for administration by mouth, *and dried slaughter-house plasma*."[159] In blockaded Leningrad, alongside the prescription of dried egg whites, casein and yeast, doctors also sought more technologized responses to hunger. Doctors used blood transfusions, glucose injections, and pharmaceutical agents, and wished to administer pre-digested proteins, an option which was impossible due to technical constraints. Doctors finally employed solutions of pre-digested proteins in the Soviet famines of 1946-1947 and endorsed their relevance.[160] The use of protein hydrolysates in the Soviet Union attests to the wide reach and circulation of scientific knowledge and powerful appeal that technical approaches amassed.

In the relief to a camp in Sandbostel, Germany, the recollections of Hans Engel, a member of the British Royal Army Medical Corps, also denoted the mixture of food and scientific concoctions. He reminisced how the relief team demonstrated effective results

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[158] Acta Psychiatrica Scandinavica, "Treatment of Famine Disease," 258-260.
[159] The Lancet, "To Guard Against Famine," 938, my emphasis.
[160] Manley, "Nutritional Dystrophy," 232, 259-260.

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with a "simple regimen" of "giving intravenous glucose and plasma alternately until patients could take liquid food […] Once they had improved they accepted milky drinks and I had two men preparing chocolate, Horlicks, Ovaltine, etc."[161] It is interesting to note how Dr. Engel considered the intravenous administration of glucose and plasma a simple nutritional plan and seamlessly integrated it with the administration of milk formulas according to medical classifications and schemes of recovery. Food was not only mixed with technical responses, but some scientific attempts even proposed medications as food. There was curiosity in studying the use of antibiotics as nutritional supplements. Throughout the 1950s, scientists investigated the "effect of antibiotics upon nitrogen or protein metabolism in the human" and its influence on weight increase and height growth.[162]

In Belsen, food relief contained a mixture of scientific creed, pool of past experiences and improvisation. Paton describes the resort to an array of options in a memoir, "Besides *gruel, soup, and tea* we had to make up our own *glucose-vitamin mixture* with hot water. We tried some *protein hydrolysate mixed with glucose*, but it was disgusting and no one would take it. We also got some *biscuits and tins of American rations*."[163] In Belsen, the inmates regarded the Bengal Famine Mixture to be overly sweet and/or greasy, refusing to eat it and even registering adverse reactions, such as diarrhea.[164] As students added lemon juice to make the glucose-vitamin mixtures palatable, some also attempted to adjust the mixture, with the better accepted milk

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[161] Hans Engel, "Mission to Belsen 1945," *British Medical Journal* 284, no. 6311 (1982): 269.
[162] R. A. Lewis, "Antibiotic Dietary Supplements in the Therapy of Childhood Protein Malnutrition," *The American Journal of Tropical Medicine and Hygiene* 5, no. 3 (1956): 494.
[163] Paton, "Mission to Belsen 1945," 1657, my emphasis.
[164] Shephard, *After Daybreak*, 99; Paton, "Mission to Belsen 1945," 1657.

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puddings for instance, while others took more forceful stands and imposed the intake of the Mixture.[165] Paton stated in his recollections, "we take a firm hand with those who refuse, *making them drink* a cup of the "famine mixture" *as though it were medicine*."[166] This provides us with insight into how nutritional concoctions have differing local significance and acceptance and how a narrow focus on physiological requirements underestimates such considerations. Weindling also highlighted how the Bengal Famine Mixture was administered by intravenous routes or feeding tubes.[167] In this light, the medicinal aspect of the Mixture is further evidenced.

To conclude, the employment of technologized solutions faced unexpected setbacks, which shed light on the benefits of food in the management of hunger. Nonetheless, medical science continued to prevail in conceptions of food and hunger. Experts considered the medical eye more capable of assessing needs and uncovering the most adequate and precise response to hunger. Food was understood according to its nutrient composition and the physiologic changes produced on the starving body. Further, science insisted on the value of technical responses to hunger, particularly in instances that demanded simplicity, rapidity and consistency. Within an overarching nutritional and medical science framework, food and technically-engineered solutions were thus combined in postwar nutrition relief. Finally, a broad medical reach predominantly characterized the responses to hunger as "treatment."[168]

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[165] Shephard, *After Daybreak*, 99-100.
[166] Paton, "Mission to Belsen 1945," 1657, my emphasis.
[167] Weindling, "'Belsenitis'," 407.
[168] In the studies discussed in this chapter, we can find this approach of hunger demanding treatment in a number of scientific articles: The Lancet, "To Guard Against Famine"; D. Murray Lyon, "Science and Post-War Relief," *Proceedings of the Nutrition Society* 3, no. 1 (1945): 53–81; Nutrition Reviews, "Starvation: 1945"; Nutrition Reviews; "Hunger Edema in Children"; Zimmer, Weill, and Dubois, "The

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2.9 Conclusion

In this chapter, we looked at the post-World War II years to analyze the medical contours of hunger and the implications for its management. We saw how World War II advanced a move toward a more professional, bureaucratic, and planning-minded humanitarianism. This rationalized design increasingly valued technical expertise and solutions. Nutritional science's influence in research and policy emerged slowly, though unsteadily, in the beginning of the twentieth century. In the post-World War II era, nutritional science was more solidly a central tool of statecraft and of international relief and reconstruction plans. The rise in nutritional science's prominence favored a biochemical view of nutrition and universal and standardized techniques for the assessment, measurement and management of hunger.[169] Nutrition experts from a variety of backgrounds and working in a range of sites contributed to the intensely scientific and medical character of hunger.

The devastated scenario of World War II provided an experimental arena for unprecedented hunger studies and for the employment of experimental technically-engineered solutions to hunger. From the United States and Western Europe to the Soviet Union, Poland, Greece and India, the geographical scope of hunger studies indicates the far-reaching circulation of medical knowledge and medicalization of hunger. Though we can note that most producers of medical knowledge on hunger were from Western Europe or the United States, Indian scientists' work was referenced in Western scientific

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Nutritional Situation in the Camps"; The Lancet, "Famine and Malnutrition in Europe"; Paton, "Mission to Belsen 1945"; Engel, "Mission to Belsen 1945"; Acta Psychiatrica Scandinavica, "Treatment of Famine Disease"; Burger, Sandstead, and Drummond, "Starvation in Western Holland: 1945"; Geoffrey Evans, "Discussion: The Physiology and Treatment of Starvation," *Proceedings of the Royal Society of Medicine* 38, no. 7 (1945): 388-398; Anderson, "The Therapeutic Use of Protein Hydrolysates."

[169] Vernon, *Hunger*, 117, 119-120, 151, 156-157.

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journals, such as *Proceedings of the Nutrition Society*, in discussions of the *Royal Society of Medicine*, and gestured to in *The Lancet*.[170] We will chart in the next chapter how these plural and peripheral voices in medical and scientific knowledge attained greater prominence in the 1960s.

Even when planning discussions acknowledged the principal need to provide food, hunger relief made a significant deployment and use of technical solutions, from protein hydrolysates to plasma, serum, whole blood and even mercurial diuretics trials. Heightened scientific interest in hunger fostered a deepened medical scrutiny into the starving body, with the production of medical classifications and employment of elaborate techniques and methodologies for assessing and responding to hunger. The locus and focus of hunger became the internal workings of the starving body, revealed by medical and nutritional knowledge. A medicalized view of hunger scrutinized physiological and biochemical bodily processes and searched for specific therapies designed to regenerate the body's damaged functions, in proper amounts, following precise medical protocols. In the post-World War II period, the management of hunger was thus inscribed in a medical framework, with an integration of medical and nutritional aid and the design of specific therapies, from technically-engineered solutions to an array of pharmaceutical substances targeting specific medical conditions, and also ordinary food. In this context, managing hunger transformed a notion of food relief into a form of treatment, circumscribed to medical control and settings. While planning discussions acknowledged the need for food, responses included the use of simple, standard, and techno-scientific mixtures. At the same time that nutrition experts recognized the efficacy

[170] Anderson, "The Therapeutic Use of Protein Hydrolysates"; Evans, "Discussion: The Physiology and Treatment of Starvation"; The Lancet, "Partial Starvation and its Treatment."

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of ordinary food in the management of hunger, they widely regarded food as a type of treatment.

These paradoxical conclusions allow us to see instances that destabilize the reductionist scientific conception of hunger and food. Even in extremely controlled hunger studies, such as the Minnesota Starvation Project, there was no way to completely constrain the subjective manifestations of hunger. Kalm and Semba showed that even if physiological improvements began to be recorded in the experiment's relief period, the participants recalled not feeling satiated or integrally recuperated with the calculated food increases.[171] Here, we glimpse at how hunger cannot be reduced to a biochemical or physiological process or food to its constituent nutrients, because they are inherently tied to social, cultural, and individual perceptions and experiences. For all the attempts of numerous and intricate tests at quantifying the caloric amounts that relief should meet to ensure recovery, the scientific immersion with micro bodily processes could not account for these broader human elements.

Even with the growing scientization of nutrition and medicalization of hunger in the post-World War II era, the medical governance was never all-encompassing. In Leningrad, the medical concept of dystrophy acquired different meanings depending on who deployed it. While Germans incorporated the term into a discourse of victimization, Soviets used it politically to denounce Nazi policies. Further, within the Soviet Union, dystrophy had plural meanings, encompassing social and politico-economic facets.[172] The recognition that nutrition relief could not be insulated in the medical realm, but was

[171] Kalm and Semba, "They Starved So That Others Be Better Fed," 1351.
[172] Manley, "Nutritional Dystrophy," 241-243, 255-257.

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integrally political, economic, and social, at times arose.[173] At the sixteenth scientific meeting of the British Nutrition Society, several scientists mentioned the need to stimulate domestic food production.[174] On the same occasion, Dr. Wilson also noted how relief needed to account for and adjust to social particularities.[175] In the wrap up of the Conference, Chairman Lord Horder evaluated the aim of the Nutrition Society as to help with the emergency provision of food relief, but acknowledged the need to stop intervening when the countries had reached stability, based on the understanding that they "*may have more to say about their own conditions* than we have and they may carry out some research of their own."[176] In spite of the paternalism embedded in the nature of humanitarianism, assertions like Lord Horder's existed.[177] The post war's increasingly expansive technical apparatus augmented humanitarianism's hierarchical nature, concealed its paternalism, and further distanced, both physically and emotionally, humanitarian actors and populations in need.[178] The space for more dialogue and understanding was continuously shrinking.

Protein hydrolysates were not originally designed with the objective to relieve starvation. In fact, in the post-World War II era, solutions to hunger came predominantly from improvising and adjusting foods used for the management of specific conditions or

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[173] Lord Horder, "Post-War Nutritional Relief," *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 214.
[174] Evang, "Discussion," 188, 204; Hammond, "Problems of Production in Relation to Post-War Nutritional Relief," 191; M. Digby, "Discussion," in *Post-War Nutritional Relief*, Chairman Lord Horder, *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 194-195; W. R. Wooldridge, "Discussion," in *Post-War Nutritional Relief*, Chairman Lord Horder, *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 196.
[175] D.C. Wilson, "Discussion," in *Post-War Nutritional Relief*, Chairman Lord Horder, *Proceedings of the Nutrition Society* 2, nos. 3-4 (1944): 202.
[176] Lord Horder, "Post-War Nutritional Relief," 215.
[177] Barnett, *Empire of Humanity*, 12.
[178] Ibid, 170, 235-236.

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more broadly to care for the ill and debilitated.[179] Protein hydrolysates' use in the Bengal famine and in European relief was influenced by a scientific euphoria around their presumed efficacy and novelty character, in disregard of their socio-cultural adequacy. A historical lens allows us to complicate this idea of protein hydrolysates as a novel scientific discovery. In the late nineteenth century, artificially digested foods made up of digestive ferments attracted great interest in countries such as the United States, Britain, France and Germany. Similar to protein hydrolysates' possible extensive promise, artificially digested foods were conceived beyond just a therapeutic aid to those with digestive debilities as a cure-all solution to health.[180] Physiologist Roberts, along with his wife's culinary wit, designed a peptonized milk-gruel, which was commercialized in a similar form by Mottershead Company as Benger's Food.[181] Marketed "for infants, invalids, dyspeptics, and all of weak digestion," Benger's Food was also attempted in the relief of malnutrition.[182]

Lisa Haushofer has sharply analysed the ambiguous nature of artificially digested foods, which discursively and materially straddled the unstable boundaries of food and medicine in the late nineteenth century. The idea and marketing of Benger's food blended scientific knowledge and home cooking through the product's packaging design, advertisement messages in both medical materials and popular recipes, and use in hospital and home settings. The attractiveness of Benger's food, therefore, relied on its technical and scientific character and connection to the kitchen, acting as both a therapy

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[179] Scott-Smith, "Defining Hunger, Redefining Food," 204-205.
[180] Lisa Haushofer, "Between Food and Medicine: Artificial Digestion, Sickness, and the Case of Benger's Food," *Journal of the History of Medicine and Allied Sciences* 73, no. 2 (2018): 169-170, 181.
[181] Haushofer, "Between Food and Medicine," 181-182.
[182] "Benger's Self-Digestive Food," *Illustrated London News,* no. 2336, January 26, 1884: 94; Scott-Smith, "Defining Hunger, Redefining Food," 204.

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and everyday food.[183] Protein hydrolysates, in the 1940s, destabilized the boundaries of food and medicine by presenting a techno-scientific solution that replaced food. The boundaries were further blurred by the fact that food itself was conceptualized as medicine, as detailed medical analyses of hunger defined the deficient physiologic functioning of the starving body, which, in turn, demanded treatment.

Looking at these challenges to the prevailing scientific concepts, I conclude that the medicalization of hunger was never totalizing, but significantly influenced the way hunger was assessed and managed in the post-World War II era. With greater impetus starting in the Second World War, narrower lenses for viewing and responding to hunger and an expansive medico-scientific control in its management were predominant. Nonetheless, we have also seen how many tensions and contradictions permeated this course of medicalization. The next chapter will follow this story into the 1960s and 1970s to analyze how the medicalization of hunger manifested in assessments and responses to hunger in a different stage: the developing world, with a greater international spotlight on experts from developing countries, and an increasing focus upon children.

[183] Haushofer, "Between Food and Medicine," 169, 181-186.

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Chapter 3

The Hybridity of Hunger: An Encounter of Scientific Paradigms, Socio-Economic Frameworks, and Technically-Engineered Solutions

3.1 Introduction

The medicalization of hunger did not recede after its postwar impulse, but followed into the 1960s with continuing features and distinct contours. This chapter will examine the medicalization of hunger from the late 1950s until the late 1970s, focusing on the scientific community's renewed attention to developing countries. The pervasiveness of hunger in these countries enhanced the presence and work of Western nutrition experts in the developing world and also led to the greater prominence of experts from developing countries in hunger research. Work on hunger also came to encompass experts in a wider range of areas: from economy to agriculture and social sciences. Coupled to this geographical reorientation, the international scientific community also redirected its nutritional focus to protein and became especially concerned with children.[1] Conceiving hunger predominantly as a protein deficiency both reinforced the medical and biochemical paradigms in defining the disease in terms of a nutrient and marked a shift with thinking and organizing hunger relief in terms of providing calories.

Though the standardization of humanitarianism does not feature prominently in this chapter, as we delve into the 1960s and 1970s, it is important to be cognizant that this

[1] Joshua Ruxin, "Hunger, Science and Politics: FAO, WHO, and Unicef Nutrition Policies, 1945-1978" (PhD diss., University of London, 1996), 50, 89-90, 152, 335-336.

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process followed actively through this period. We have seen how, after World War II, there was a growth in the centralization and bureaucratization of humanitarian aid, which represented a continuity of the interwar impulse, but now acquired a much larger scale and impetus.[2] Into the 1960s, the humanitarian field continued to become increasingly bureaucratized and standardized.[3] Humanitarian organizations' embrace of more complex, large-scale, and even long-term relief projects also contributed to their professionalization, instigating the growth and organization of structures of governance.[4] The Cold War's many conflicts along its geopolitical peripheries shaped the scenario for increasingly systematized and expeditious humanitarian technologies.[5] The development of these technical humanitarian tools, such as standardized protocols, assessments, and pre-assembled, specific kits of supplies emphasized mobility at the expense of context-sensitive approaches.[6] An attention to bureaucratic, uniform, and controlling relief techniques that could ensure efficiency and efficacy permeated accounts of relief workers.[7] The Nigeria-Biafra conflict in the late 1960s marked the crystallization of the

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[2] Michael Barnett, *Empire of Humanity: A History of Humanitarianism* (Ithaca: Cornell University Press, 2011), 105.
[3] Heike Wieters, "Reinventing the Firm: From Post-War Relief to International Humanitarian Agency," *European Review of History: Revue Européenne d'Histoire* 23, nos. 1-2 (2016): 118.
[4] Ibid, 127-128.
[5] Peter Redfield, "Cleaning Up the Cold War: Global Humanitarianism and the Infrastructure of Crisis Response," in *Entangled Geographies: Empire and Technopolitics in the Global Cold War*, ed. Gabrielle Hecht (Cambridge: MIT Press, 2011), 269.
[6] Ibid, 268.
[7] Some examples can be seen in: Lawrence K. Altman, "Famine Is Called Epidemic Disease: Expert Says Control Lies in Use of Medical Methods," *The New York Times,* November 13, 1969: 18; J.P. Miller, "Medical Relief in the Nigerian Civil War," *The Lancet* 295, no. 7660 (1970): 1331, 1333; Sue Peel, "Practical Relief and Preventative Methods: Selective Feeding Procedures," *Disasters* 1, no. 3 (1977): 184-188.

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contemporary humanitarian nutrition methods of assessment, relief management and types of emergency foods used.[8]

Mindful of this expanding technocratic development of humanitarian aid, I will trace the points of continuity in the medicalization of hunger and center around the plural lenses governing the conceptualization and management of hunger. This chapter makes two main arguments. Firstly, I probe the enduring features in the medicalization of hunger. This manifested itself in the medical scrutiny, underscored by the protein paradigm, the distinct regional manifestations of kwashiorkor and the attempt for a standardized diagnostic criteria. The medical character of hunger also persisted in the view of hunger as a disease and the view of food as medicine. Hunger relief continued to be inserted in a medical framework that integrated the response to hunger alongside other conditions and saw relief as treatment. In line with the medical and scientific character of nutritional solutions, experts prescribed both food and techno-scientific solutions to hunger.

I then investigate how the predominant scientific conception of a world protein gap influenced the conceptualization of and responses to hunger. In the 1950s and 1960s, the scientific community coalesced around the protein paradigm, leading to the rise of protein-rich food mixtures in the management of hunger, which was short-lived, but had lasting implications. In his dissertation, Scott-Smith undertook a detailed examination of the surge of new protein sources and the development of protein-rich emergency foods.[9] While I note this important moment in the history of humanitarian nutrition, I am more

[8] Tom Scott-Smith, "Defining Hunger, Redefining Food: Humanitarianism in the Twentieth Century" (PhD diss., University of Oxford, 2014), 122-124.
[9] Ibid, especially Chapters 5 and 6.

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interested in vigorously pointing to an under-emphasized insight in the literature on histories of hunger. Various underlying frameworks and manifold nutritional solutions tell us how the history of hunger is permeated by coeval paradigms and conflicting views, while becoming increasingly internationalized and focused upon children.[10] Within the scientific community and nutrition policy-making circles, hunger could be regarded holistically or more narrowly, inflected with paternalist stances or more socio-culturally sensitive approaches. Sometimes, they involved a complex blend of all these features. In spite of this hybrid picture, there was a consistent resort to technically-engineered products and faith in scientific solutions.

3.2 "A World Beset With Ever More People And Ever Less Food"[11]

After World War II, vigorous attention from academics, policy makers and the general public turned to the world food problem, which acquired global dimensions.[12] The interest and concern of Europeans and Americans with the problem of world hunger and the availability of food supplies was a relatively recent phenomenon that emerged in the post-World War II era. Previously, discussions of food supply and hunger were largely circumscribed to imperial or European boundaries. After World War II, multiple

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[10] Though Vernon does not make this argument as straightforward as I articulate above, the plural and coexistent models that informed hunger is a central idea I extracted from the history Vernon delineates. James Vernon, *Hunger: A Modern History* (Cambridge: Belknap Press of Harvard University Press, 2007).
[11] This sentence is extracted from the news story: George Alexander, "Global Malnutrition 'Epidemic' Feared: Developed Nations Also Threatened, Science Parley Told," *Los Angeles Times,* February 20, 1976: B24.
[12] If concerns with the world's food supply and world population can be traced to Malthusian debates, the idea of a world food problem, supported by an emerging international architecture, gained systematic impetus and captured the spotlight among the academic community, scientific circles and public arena in the post-World War II era. Some examples of works already grappling with the world food problem in the immediate post-World War II, a concern that amassed urgency and vigor along the 1960s include: Theodore W. Schultz, *Food for the World* (Chicago: University of Chicago Press, 1945); John Boyd-Orr, "The Food Problem," *Scientific American* 183, no. 2 (1950): 11-15; H.A. Spoehr, "Chlorella as a Source of Food," *Proceedings of the American Philosophical Society* 95, no. 1 (1951): 62-67.

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factors instigated the heightened visibility and the proliferation of works on the world food problem: an increase of academic interest and public awareness on the subject, the creation of international organizations dedicated to the topic, and conflicting ideological views on the roots and solutions to the problem.[13] The FAO, WHO, and Unicef, for example, advanced a conception of a world food problem, in putting forth the idea of a growing asymmetry in nutritional conditions between developed and developing countries.[14]

Mechanisms for debating and disseminating the world food problem were, therefore, well established by the 1960s. This ensured the wide reach of alarming economic and scientific prospects of the world food situation, starting in the 1950s and solidifying in the early 1970s. In 1967, the US President's Science Advisory Committee Panel on the World Food Supply projected a catastrophic dynamic of supply and demand in the developing countries by the late 1980s, pressured by the population increase, if the extant situation remained unchanged.[15] To some, the 1970s seemed to indicate a "fundamental shift in the structure of the world food economy." Analysts looked with concern at the escalating food demand, population increase, growth though concentration of affluence, surge of food and energy prices, and food exports being used to supply domestic demand.[16] Amid this scenario, economic, agricultural, and planning experts participated more actively in nutrition forums and bodies.[17] The public health scholar

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[13] David Grigg, *The World Food Problem* (Oxford: Blackwell, 1993), 1-3.
[14] N.W. Pirie, "World Hunger as a Biochemical Problem," *Journal of the Royal Society of Arts* 106, no. 5023 (1958): 512.
[15] Leroy Blakeslee, "The President's Science Advisory Committee's Report on the World Food Problem: An Overview," *American Journal of Agricultural Economics* 50, no. 5 (1968): 1254.
[16] Lester Brown and Erik Eckholm, *By Bread Alone* (New York: Praeger, 1974), quote on 5, also 3-6.
[17] Joshua Ruxin, "Hunger, Science and Politics: FAO, WHO, and Unicef Nutrition Policies, 1945-1978," (PhD diss., University of London, 1996), 335-336.

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Ruxin has argued that that a disease-oriented approach, which predominantly governed the understanding and management of hunger until 1955, shifted toward a broader conceptualization of hunger after the mid-1950s. This reshaped conception, without erasing the disease-oriented paradigm, increasingly included agriculture, education and economy as lenses for viewing and responding to hunger.[18]

During the 1950s and 1960s, the prevalent explanatory framework for the world food problem was population growth, while, in the 1970s, analysts considered more vigorously the role of poverty in hunger.[19] The US President's Science Advisory Committee Panel on the World Food Supply employed holistic lenses to view the world food problem, by considering its complexity and the existing lack of comprehensive programs. It also regarded the issue as deriving from both the population increase and low economic development in the developing world.[20] The agricultural economist Lester Brown, and the researcher Erik Eckholm outlined a response plan to world hunger that accounted for the politico-economic structures and social contexts that were part of the world food problem. They suggested a reduction in the demand for food, through curtailing population growth of the poor and the wealthy, and limiting the wealthy's waste and abundant use of resources, as well as a boost of developing countries' agronomic potential.[21] These more comprehensive lenses existed alongside reductionist scientific outlooks. In a lecture of the Royal Society of Arts, the British biochemist Pirie emphasized the value of biochemical research and food technology in creating and

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[18] Ibid, 111.
[19] Grigg, *The World Food Problem*, 55, 263-264.
[20] Blakeslee, "The President's Science Advisory Committee's Report on the World Food Problem," 1252, 1259-1260.
[21] Brown and Eckholm, *By Bread Alone*, 12-15.

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shaping nutritional components and in being useful to find solutions to both the quantity of food available and to "research on contraception."[22]

The global food problem was, thus, a hot topic among international organizations and governments, while also featuring in multiple scientific conferences and academic forums of international and national character.[23] The 1974 United Nations' World Food Conference stood as an emblematic example of this international arena of debate, which counted with the presence of 133 country representatives from all corners of the world.[24] Besides discussions that took place on an international level, regional and national organizations from developing countries voiced concern and delved into the world food debate. A Summit of the Non-Aligned Movement called for action from the international community to ameliorate the food crisis felt deeply in developing countries.[25] The Latin American Society of Nutrition discussed solutions to the food shortage in its first Conference and questioned the assumptions and responses underlying the food debate in its journal Latin American Archives of Nutrition.[26] The Indian Central Food Technological Research Institute explored this thematic amid their work for solutions to

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[22] N.W. Pirie, "World Hunger as a Biochemical Problem," *Journal of the Royal Society of Arts* 106, no. 5023 (1958): 515, 518-520.
[23] Some examples I draw on along this chapter include discussions or works from the American Association for the Advancement of Science, California Institute of Technology, Royal Society of Arts, International Congress on Nutrition, and the International Food Congress.
[24] United Nations, *Report of the World Food Conference*, Rome, 5-16 November, 1974 (New York: United Nations, 1975), 25.
[25] "4th Summit Conference of Heads of State or Government of the Non-Aligned Movement," Held at Algiers, from 5 to 9 September, 1973, 65-66.
[26] J. E. Dutra De Oliveira. "Informe Sobre El Primer Congreso de la Sociedad Latinoamericana de Nutrición. Caracas, 1-4 De Septiembre de 1968," *Archivos Latinoamericanos de Nutrición* 21, no. 1 (1970): 68-69; "The Political Economy of Malnutrition: Generalizations From Two Central American Case Studies." *Archivos Latinoamericanos de Nutrición* 23, no. 4 (1972): 496.

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the food shortage and widespread insufficient diets in India.[27] These cases shed light into the global character of the world food problem, the participation of developed and developing countries in its discussion, and the involvement of high political echelons, including agricultural, economic, nutrition and science experts.

This debate also permeated the public arena through news reports that often referenced scientific deliberations. Schmeck Jr., reporting on the 1960 symposium of the Fifth International Congress on Nutrition, highlighted the salient and grave global problem of hunger, which "dwarfs in potential gravity both the tensions of the cold war and the suspended threat of nuclear holocaust." The symposium accredited science and technology as the promising engines to counter the population increase, expand food supply, and enhance nutrition. Though the experts envisioned these transformations as "technically feasible," they lamented the barriers imposed by the limited scientific development in developing countries and the hindering socio-economic factors of "poverty, superstition and ignorance."[28] A *Christian Science Monitor* correspondent disseminated the discussions that took place at the International Food Congress in September, 1962. On this occasion, the assembled representatives of American and international food industries discussed the idea of a "Marshall Plan" to counter world hunger, whereby a food industry committee could be established to advise and provide services to the FAO. Binay Ranjan Sen, the director-general of the FAO at the time, further highlighted the crucial role that the Western food industry, with its expertise and

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[27] H. A. B. Parpia and V. Subrahmanyan, "Some Aspects of the Utilization of Food Research in India," in *Some Aspects of Food Technology in India* edited by H.A.B Parpia et al., Central Food Technological Research Institute (Mysore: Wesley Press, 1959), 1.
[28] Harold M. Schmeck Jr., "The World's Food: Science and Technology Are In a Desperate Race With Population," *The New York Times*, September 11, 1960: E11.

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robustness, could play in world hunger through a "global action and aid program."[29] A news story in the *Los Angeles Times* publicized the debates of a 1963 California Institute of Technology seminar. In this event, Dr. Borsook, who designed the first multi-purposed food in the mid-1940s, highlighted the potential of nutritional science's knowledge and the use of technology combined to the industry's production capacity to alleviate global hunger.[30] A reporter of *The Washington Post* relayed the topics debated at a 1964 international conference hosted by the US National Academy of Sciences, which considered hunger as "the world's most serious public health problem."[31]

Such media interest in the world food problem extended well into the 1970s. In 1976, the Times Science Writer, George Alexander, alarmingly depicted the concern that emanated from the 142nd American Association for the Advancement of Science gathering: "chronic malnutrition might begin to sweep across the globe with nearly the rapidity of a flu epidemic if the world's population continues to multiply without restraint and if the world's food supplies […] should be reduced by drought or some other calamity."[32] The article, titled "Global Malnutrition 'Epidemic' Feared," sums up well the general message put forth in many of these news stories, which resorted to scientific expertise to portray an imminent and fast-spreading world hunger crisis. Conceptualizing

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[29] Harry C. Kenney, "Food Men Offer World Recipes: Others Concur," *The Christian Science Monitor*, September 12, 1962: 12.

[30] Los Angeles Times, "Nutrition Seen as Key to World Food Problem: Caltech Biochemist Says Technology and Industry Can Provide Improved Nutrients," *Los Angeles Times*, May 5, 1963: B4. Multi-Purpose Food was a can of pre-cooked soy and vegetables that would be made into a gruel. It was designed to supply a bulk of a person's daily nutritional requirements. See Scott-Smith, "Defining Hunger, Redefining Food: Humanitarianism in the Twentieth Century" (PhD diss., University of Oxford, 2014), 177-180.

[31] Eve Edstrom, "Malnutrition Called No. 1 Public Health Problem," *The Washington Post*, December 8, 1964: A19.

[32] George Alexander, "Global Malnutrition 'Epidemic' Feared: Developed Nations Also Threatened, Science Parley Told," *Los Angeles Times,* February 20, 1976: B24.

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this "crisis" as a technical and medical issue both simplified the causal mechanisms to an insufficient food supply and an ominous population growth and circumscribed the problem to one of emergency character. Many scientific experts thus entrusted science, industry, and technology as the solving mechanisms. However, dissonant voices also emerged in newspaper accounts and looked beyond superficial analyses and fixes. McLaughlin, a senior fellow at the (now extinct) US-based Overseas Development Council, in an editorial in *The New York Times*, offered a critical view on the world food problem. He acknowledged the politico-economic roots of hunger in asserting that, "it is the lack of adequate *demand* (or income), not of supply, that keeps people malnourished […] neither the international food system nor the national and international political structures permit them [hungry people] to grow or buy their food."[33] Opposing the general conclusions and outcomes of international food conferences, McLaughlin shed light on the "malfunction[s]" of the international food system and the "systemic and structural causes" of hunger: "underdevelopment, inequity, [and] injustice."[34]

The subject of world hunger was, therefore, intensely debated in political, scientific and public arenas, suffusing discussions at the national and international stage. Developing countries, those at the epicenter of the problem, also articulated their views on the issue. If hunger in the post-World War II era was predominantly viewed through medical lenses, we have seen that the 1960s saw the greater involvement of experts in economics, agriculture and planning in the nutritional realm. While scientific views were more prone to consider hunger through a technical prism and prescribe technologized

[33] Martin McLaughlin, "Of Feasts and Famines," *The New York Times*, June 14, 1977: 33, original emphasis.
[34] Ibid.

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solutions, economists and development workers bore a more comprehensive outlook, aware of hunger's structural causes. The 1960s and 1970s, thus, were infused with coexisting frameworks: a resurgence of Malthusian fears, a medico-scientific framework and a politico-economic rationale.

3.3 More Actors in a Different Setting

3.3.1 A Move Towards the Developing World

Our journey into the 1960s and 1970s takes place in a different locale: from the largely European context after World II to a focus on hunger in the developing world. After World War II, international development projects expanded, driven by a synergic conjunction of government policies, increasing numbers of non-governmental organizations, and emerging international institutions.[35] New areas of development studies contributed to this escalation of the development agenda to be implemented in the Third World.[36] With the gradual stabilization of Europe's humanitarian emergencies, the end of the 1940s saw the frenzied wave of postwar relief to Europe decelerate.[37] The reconfiguration of needs compelled many relief organizations to broaden their postwar humanitarian missions to more structural development programs, turning to where the need now resided: developing countries.[38] This new geographic frame and the intensification of development initiatives also fueled more comprehensive approaches to hunger. In this broadening spirit that gained impetus in the late 1950s, Unicef devised applied nutrition programs, which sought to foster local nutrition education and training

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[35] David Ekbladh, *The Great American Mission: Modernization and the Construction of an American World Order* (Princeton: Princeton University Press, 2010), 4, 6-7.
[36] Barnett, *Empire of Humanity*, 100.
[37] Wieters, "Reinventing the Firm: From Post-War Relief to International Humanitarian Agency," 122.
[38] Ibid, 122, 126-127; Barnett, *Empire of Humanity*, 108.

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as well as initiatives for the local development of protein foods.[39] However, while the FAO, Unicef and WHO rhetorically defended long-term and structurally-mindful projects, their high cost and complex implementation saw the UN agencies focus on technical solutions, with verticalized programs of supply distributions that could effectively produce measurable results. Nutrition studies and policies of the late 1950s were thus permeated by both "quick 'magic bullet' solutions" and more holistic approaches that attempted to expand nutrition programs to include nutrition education and applied nutrition programs.[40]

3.3.2 The Global Character of Hunger Expertise

This period also featured a greater array of actors: leading research from Western pediatricians in developing countries and the pioneering nutrition work of experts from developing countries.[41] From the late 1940s and into the 1960s, Western scientists, especially pediatricians, more vigorously participated in research institutions in the developing world investigating childhood malnutrition.[42] The American doctor trained in public health and epidemiology, Dr. Roy Brown, worked in the Department of Pediatrics and Child Health of the Makere Medical School in Kampala, Uganda.[43] In the immediate aftermath of World War II, the British physician Waterlow conducted research on children's physiological and nutritional states in Guyana, Trinidad and Jamaica. From 1950, Waterlow regularly worked at the University of West Indies under the Faculty of

[39] Ruxin, "Hunger, Science and Politics," 137.
[40] Ruxin, "Hunger, Science and Politics," 101, 115-116, 149.
[41] Ruxin, "Hunger, Science and Politics," 50, 65, 70.
[42] Ibid, 50.
[43] Roy Brown, "A Standard for Childhood Malnutrition?" *Clinical Pediatrics* 4, no. 10 (1965): 565; Columbia University, "Roy Brown," Columbia Mailman School of Public Health, accessed March 26, 2019, https://www.mailman.columbia.edu/people/our-faculty/reb8.

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Medicine and, later, in the Tropical Metabolism Research Unit.[44] The British physician McLaren worked at the American University in Beirut.[45] The esteemed US researcher Nevin Scrimshaw, member of the US National Academy of Sciences, with a medical degree and graduate diploma in public health, established the Institute of Nutrition of Central America and Panama (INCAP) in 1949 and directed its activities until 1961.[46] The Belgian specialist in pediatrics, Henri-Louis Vis, conducted research in Rwanda and Zaire.[47] The US biochemist and doctor specialized in clinical nutrition, Robert Olson, with funding from the US National Institutes of Health, founded a Clinical Research Center in Chiang Mai University, Thailand. His period as head of the Center offers an example of the kind of international intellectual exchange that was ripe among scientists in that time concerning the topic of malnutrition: "[In Thailand, Dr. Olson] carried out an extensive study in the pathophysiology of protein-calorie malnutrition which has resulted in the publication of some 40 research papers co-authored by American, European and Thai collaborators."[48]

This was also a context where several researchers from developing countries rose to international prominence in nutrition research.[49] They worked both in their home countries and in developed countries, while establishing international research ties. The South African doctor, John Hansen, was a Harvard Research Fellow, obtained a

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[44] J.C. Waterlow, "Childhood Malnutrition In Developing Nations: Looking Back And Looking Forward," *Annual Review of Nutrition* 14, no. 1 (1994): 2-3.
[45] Ibid, 3; [45] Richard D. Semba, "The Rise And Fall of Protein Malnutrition in Global Health," *Annals of Nutrition & Metabolism* 69, no. 2 (2016): 81.
[46] Pamela Fraker, "Biographical Memoirs: Nevin Stewart Scrimshaw," (National Academy of Sciences, 2016), 2, 5.
[47] Henri-Louis Vis, Philippe Goyens, and Daniel Brasseur, "Rwanda: The Case For Research In Developing Countries," *The Lancet* 344, no. 8927 (1994): 957; Waterlow, "Childhood Malnutrition In Developing Nations," 3.
[48] William J. Darby, "Robert E. Olson Appointed Editor of *Nutrition Reviews,*" *Nutrition Reviews* 36, no. 10 (1978): quote on 291, also 290.
[49] Ruxin, "Hunger, Science and Politics," 50, 336.

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Rockefeller scholarship, and was a committed Professor and researcher of nutritional pediatrics in South African universities.[50] The Guatemalan, Moisés Béhar, a physician educated in the University of San Carlos with a specialization in Pediatrics and Hepatology from the University of Paris, and a Harvard Master's degree in Public Health, worked at INCAP and was assigned its director in 1961, upon Scrimshaw's leave. In 1975, Béhar became Chief of the World Health Organization's Department of Nutrition, and, along his career, participated actively in Guatemalan and American scientific societies.[51] The Indian Coluthur Gopalan earned his medical degree from Madras Medical College and undertook a series of graduate specializations in the United Kingdom. Dr. Gopalan was a central figure in India and abroad in the fight against hunger, holding a number of prominent positions along his career. He established the Indian National Institute of Nutrition, and was Director of the Indian Council of Medical Research and of the Nutrition Foundation in India. Dr. Gopalan's international recognition and influence was also evident through his inauguration of the Asian Congresses of Nutrition, foundation of the Federation of Asian Nutrition Societies, and engagement with a number of international scientific bodies, from being President of the International Union of Nutritional Sciences to participating in various WHO Committees.[52]

The Chilean pediatrician, Julio Meneghello, obtained his medical degree at the University of Chile and conducted specialized graduate programs at Harvard, Johns

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[50] Sven Hansen, Rob Hansen, and Tony Hansen, "In Memoriam: John Hansen," *South African Medical Journal* 101, no. 6 (2011): 386.
[51] Carlos Ossenbach, "In Memoriam: Moisés Béhar (1922-2015)," *Lankesteriana International Journal on Orchidology* 15, no. 1 (2015): 1.
[52] The National Medical Journal of India, "Classics in India Medicine: C. Gopalan," *The National Medical Journal of India* 5, no. 3 (1992): 145; Nutrition Foundation of India, "Dr. C Gopalan," accessed November 23, 2018, http://nutritionfoundationofindia.org/pdfs/About-and-Others/President-at-NFI.pdf.

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Hopkins and Cornell Universities. Dr. Meneghello is considered the "father of modern pediatrics in Chile," especially for his role in introducing the systematic use of oral hydration therapy in child malnutrition, internationally recognized as a major medical advance for developing countries in the twentieth century.[53] The Mexican Federico Gómez Santos was a military doctor graduated from the Mexican Military-Medical School, who complemented his education in pediatrics in the US, at the St. Louis Children's Hospital and the Mayo Clinic in Rochester. Dr. Gómez Santos was central in developing modern clinical nutrition in Mexico, especially through establishing and directing the Mexican Children's Hospital and the Hospital of Pediatrics of the Mexican Social Security Institute. His work also acquired international reach: In the 1950s, Dr. Gómez Santos was in charge of the Maternal-Child department of the now named Pan-American Health Organization in Washington, and Director of District IX of the American Academy of Pediatrics.[54] These stories tell us about the global character of nutrition work and the greater involvement of experts from developing countries in distinguished arenas.

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[53] Universidad de Chile, "Julio Meneghello Rivera: Premio Nacional de Ciencias Aplicadas y Tecnológicas 1996," Accessed November 15, 2018, http://www.uchile.cl/portal/presentacion/historia/grandes-figuras/premios-nacionales/ciencias-/6552/julio-meneghello-rivera; Hugo Rodríguez Bernal, "Crónicas de los Tiempos: Dr. Julio Meneghello Rivera," *Diario El Andino*, January 8, 2018, http://www.elandino.cl/2018/01/08/cronicas-de-los-tiempos-dr-julio-meneghello-rivera/.

[54] Fundación Bengoa, "Federico Gómez," accessed November 15, 2018, https://www.fundacionbengoa.org/personalidades/federico_gomez.asp; Cuban Society of Clinical Nutrition, "In Memoriam: Dr. Federico Gómez Santos (1897-1980)," last modified December 19, 2004, accessed November 15, 2018. http://www.nutricionclinica.sld.cu/Patrimonio/FedericoGomez.htm; Romeo S. Rodríguez-Suárez, "Centenario del Natalicio del Dr. Federico Gómez Santos," *Revista Biomédica* 8, no. 4 (1997): 274.

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3.4 The Spotlight of International Nutrition Centers on Protein and Childhood Malnutrition

3.4.1 The World Protein Gap

Though protein received attention from nutritional research and influenced policy decisions since the nineteenth century, from the 1950s until the early 1970s, protein was the main scientific dogma for conceiving the causes of and responses to hunger.[55] Starting in the 1950s, international experts predominantly directed the nutrition spotlight on protein. The FAO and WHO conducted nutritional studies in the early to mid-1950s, which depicted a critical nutritional scenario of insufficient protein intake among the poor of Latin America and Africa.[56] A great instigator for this research interest came from a joint FAO/WHO research project: the 1952 Brock-Autret report. In identifying the existence of kwashiorkor in various African territories, nutrition experts Brock and Autret, like Cicely Williams back in 1933, saw kwashiorkor as likely induced by protein deficiency.[57] Following the Brock-Autret report and scientists' findings of the widespread presence of kwashiorkor in a multitude of developing countries, there was a rush of scientific interest in researching kwashiorkor.[58] If we have seen that in the immediate postwar relief efforts experts were concerned with providing calories to relieve hunger,

[55] Kenneth J. Carpenter, "The History of Enthusiasm for Protein," *The Journal of Nutrition* 116, no. 7 (1986): 1364-1367.
[56] Elizabeth Orr, "The Contribution of New Food Mixtures to the Relief of Malnutrition: A Second Look," *Food and Nutrition* 3, no. 2 (1977): 2.
[57] Ruxin, "Hunger, Science and Politics," 68- 70.
[58] Ruxin, "Hunger, Science and Politics," 68-70.

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the belief in the severity and extensive presence of kwashiorkor in the developing world inaugurated a marked shift in scientific and policy thinking.[59]

From the third session of the Joint FAO/WHO Expert Committee on Nutrition, convened in 1952, the concept of protein malnutrition emerged.[60] The gathering cemented the new focus of the international nutrition community on protein malnutrition. What scientists were truly fascinated with was kwashiorkor, given its distinctive and under-researched nature, which directed a special attention to research and policy concerning child nutrition.[61] The Expert Committee devised the concept only tentatively in the attempt to grapple with a subject of "fundamental importance throughout the world."[62] Even as the Committee called for a plurality of "technicians," such as economists, sociologists and nutritionists, in programs to improve nutrition, it retained a scientific-minded framework not least in considering these specialists as technicians, but also in assessing that the "outstanding need is for scientific knowledge of protein requirements at various ages, and here both the quantity and the quality of the protein are of paramount importance."[63] Internationally renowned researchers gathered at a 1953 protein malnutrition conference in Jamaica concurred that protein deficiency emerged as the most pressing nutritional problem of the time.[64] In 1955, the WHO established the

[59] The Brock-Autret Report of 1952 claimed that: "[kwashiorkor] is the most serious and widespread nutritional disorder known to medical and nutritional science." This quote was cited in: Donald McLaren, "The Great Protein Fiasco," *The Lancet* 304, no. 7872 (1974): 93.
[60] Semba, "The Rise And Fall of Protein Malnutrition in Global Health," 80-81.
[61] Ruxin, "Hunger, Science and Politics," 70, 90-92.
[62] World Health Organization, "Joint FAO/WHO Expert Committee on Nutrition: Third Report," Technical Report Series No. 72, Geneva: World Health Organization, 1953, 4.
[63] Ibid, quote on 17, also 15-16.
[64] Ruxin, "Hunger, Science and Politics," 94, 97.

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Protein Advisory Group (PAG), which further centered the topic of protein malnutrition in developing countries on the international and scientific arena.[65]

In 1959, Jelliffe, an expert in pediatrics and nutrition, put forth the concept of *protein-calorie malnutrition*, which was adopted in 1961 by the FAO and WHO.[66] The renewed conception cemented the international community's acknowledgment of a malnutrition spectrum: the polar types of marasmus, predominantly a calorie deficiency, and kwashiorkor, chiefly a protein inadequacy, with intermediate forms that had combined features in different degrees in between.[67] Even if the prevalent concept of protein-calorie malnutrition alluded to the different forms of malnutrition, until the early 1970s, the international emphasis largely remained on the protein deficiency side of the protein-calorie equation.[68] The scientific community's phenomenal attention to kwashiorkor shaped the idea of a world protein gap. Firmly consolidated in the 1960s, the idea that protein deficiency represented the gravest nutritional issue became the dominant scientific paradigm and came to permeate national and international policy discussions.[69]

3.4.2 Centering Childhood Malnutrition

A confluence of factors contributed to placing children in the spotlight of nutritional and humanitarian attention starting in the 1950s: the primacy of kwashiorkor, a concern with the permanent impairments of malnutrition in young children, and the

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[65] Nevin S. Scrimshaw, "Foreword," in *The Use of Protein-rich Foods for the Relief of Malnutrition in Developing Countries: An Analysis of Experience*, by Elizabeth Orr (London: Tropical Products Institute, 1972), v-vi.
[66] Donald McLaren, "The Great Protein Fiasco," *The Lancet* 304, no. 7872 (1974): 93; Semba, "The Rise And Fall of Protein Malnutrition in Global Health," 82.
[67] D. B. Jelliffe, and J. P. Stanfield, "Protein Deficiencies and Calorie Deficiencies," *The Lancet* 288, no. 7469 (1966): 908.
[68] Kenneth Carpenter, *Protein and Energy: A Study of Changing Ideas in Nutrition* (New York: Cambridge University Press, 1994), 161-163.
[69] Carpenter, *Protein and Energy*, 161-162; Ruxin, "Hunger, Science and Politics," 72, 96-97, 109, 118-119, 229, 244, 246; McLaren, "The Great Protein Fiasco," 93.

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worrisome connection between infection and malnutrition. In essence, the concern with protein was really a concern with kwashiorkor, designated to describe a specific type of malnutrition in children. Thus, both international research efforts and the provision of protein-rich foods focused upon childhood malnutrition. In the late 1950s, international organizations adhered to the scientific consensus that children under five constituted the most vulnerable group, consolidating an international prioritization of malnourished young children and protein weaning foods.[70] Scientific consensus and humanitarian guidelines acknowledged the special vulnerability of children to malnutrition among the general population. Pregnant and lactating women, the old, and the sick were also conceived as physiologically vulnerable, though limited relief resources would prioritize children and direct relief efforts at women for their benefit upon the health of future newborns and young children.[71] Through the 1960s, multiple international gatherings discussed the topic of childhood malnutrition and the protein problem.[72]

Another impetus to the spotlight on children came from a surge of systematic scientific studies in the 1960s that delved into the topic of the developmental faults that derived from starvation.[73] The predominant scientific idea understood that severe malnutrition, when experienced at a crucial juncture of young children's central nervous system development, had a "long-term persistent effect not only on measured intelligence

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[70] Ruxin, "Hunger, Science and Politics," 109, 111, 119-123.
[71] Derrick B. Jelliffe, and E.F. Patrice Jelliffe, "Famine and the Family," *The Journal of Tropical Pediatrics* 16, no. 3 (1970): 91; Peel, "Practical Relief and Preventative Methods," 179-180.
[72] Some examples include the 1960 US-sponsored Conference "Meeting Protein Needs of Infants and Children," the 1963 International Congress of Nutrition, and the 1964 International Conference on the Prevention of Malnutrition in the Pre-School Child. Semba, "The Rise And Fall of Protein Malnutrition in Global Health," 82.
[73] Joaquin Cravioto and Elsa Delicardie, "Mental Performance in School Age Children: Findings After Recovery From Early Severe Malnutrition," *American Journal of Diseases of Children* 120, no. 5 (1970): 404; David Coursin, "Effects of Undernutrition on Central Nervous System Function," *Nutrition Reviews* 23, no. 3 (1965): 65.

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but also in learning such basic academic skills as reading and writing."[74] Scientists were especially concerned that it was a deficiency of protein intake which would cause permanent physiological and mental damages.[75] The heightened distinctiveness of children was thus cemented by scientific knowledge on the child's specific and vulnerable life stage. Finally, from the late 1950s onwards, scientific attention turned to associating the substantial childhood mortality rates in developing countries, usually attributed to infectious diseases, with the aggravating synergy between malnutrition and infection.[76]

3.5 The Continuance of the Medicalization of Hunger

3.5.1 Medical Scrutiny

The scientific focus on kwashiorkor and protein deficiency continued to impel a medical scrutiny into the hungry body, especially those of children. Scientific divergences around the causes of kwashiorkor and the different manifestations of hunger drove more interest toward clinical and laboratory investigations into hunger in developing countries. According to Ruxin, it was precisely kwashiorkor's distinctiveness that called for biochemical and physiological scrutiny and instigated searches for diagnostic methods.[77] The view of protein as the prominent nutrition problem underscored scientific interest. In 1965, Dr. Brown invoked the Brock-Autret report to

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[74] Cravioto and Delicardie, "Mental Performance in School Age Children," 409.
[75] Brown and Eckholm, *By Bread Alone*, 31; Elizabeth Orr, *The Use of Protein-rich Foods for the Relief of Malnutrition in Developing Countries: An Analysis of Experience*, London: Tropical Products Institute, 1972, 2.
[76] Scientific studies increasingly linked the onset of malnutrition to infectious diseases and the fatality of infections when combined to malnutrition. Nevin S. Scrimshaw, "INCAP Studies of Nutrition and Infection," *Food and Nutrition Bulletin* 31, no. 1 (2010): 54, 56, 61; Alan D. Berg, "Malnutrition and National Development," *Foreign Affairs* 46, no. 1 (1967): 126.
[77] Ruxin, "Hunger, Science and Politics," 68-70, 92.

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proclaim, "Protein-calorie deficiency, as the most fatal and widespread nutritional disorder known to medicine."[78] Scientific debate was fertile in devising concepts and creating classifications for hunger, based on mathematical scientific models, that could account for the type (if marasmus, kwashiorkor or blended forms) and degrees of severity of malnutrition.[79] Studies sought to unravel the etiology and the specific manifestations of malnutrition, investigating whether marasmus and kwashiorkor "represent[ed] two distinct and different diseases with different aetiological backgrounds and calling for different methods of approach with regard to prevention and control, or whether they represent[ed] two distinct facets of the same disease."[80]

Scientists' recognition of the diverse clinical characteristics and regional variations of malnutrition further impelled internal examinations.[81] The medical characteristics of the different types of malnutrition seemed to defy universal scientific theories, even as international experts convened to define uniform diagnostic criteria. For example, while some scientists traced the causal mechanisms of edema to low albumin levels, others questioned its validity. Complementary factors, such as deficiency in potassium, proved influential in some cases, such as in Jamaica, whereas in Zaire, studies

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[78] Brown, "A Standard for Childhood Malnutrition?" 567.
[79] J. C Waterlow, "Classification and Definition of Protein-Calorie Malnutrition," *The British Medical Journal* 3, no. 5826 (1972): 566-568.
[80] C. Gopalan, "Kwashiorkor and Marasmus: Evolution and Distinguishing Features. 1968," *The National Medical Journal of India* 5, no. 3 (1992): 147; see also Waterlow, "Classification and Definition of Protein-Calorie Malnutrition," 566.
[81] R.G. Whitehead, "Biochemical Tests In Differential Diagnosis of Protein and Calorie Deficiencies," *Archives of Disease in Childhood* 42, no. 225 (1967): 483; M. L. Magotra, P. K. Sircar, and O. P. Katira, "Protein-Calorie Malnutrition: A Study of 160 Cases," *Indian Journal of Pediatrics* 43, no. 3 (1976): 10, 13.

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could not correlate potassium deficiency to edema. These plural manifestations of malnutrition, largely attributed to environmental differences, interested many scientists.[82]

Researchers continued to resort to biochemical and metabolic tests to provide a more accurate diagnosis of malnutrition and especially to distinguish between different forms of deficiencies.[83] In Whitehead's study in Kampala, Uganda, he was attentive to the malnourished children's clinical features, while also preoccupied with employing scientific methods to blood analysis, and urine and stool examination.[84] In search of a more "objective differential diagnosis" beyond just a clinical observation, Whitehead assessed indexes such as glucose, hemoglobin, serum protein, plasma amino acid ratio, and hydroxyproline (an amino acid).[85] A study of malnutrition in Pune, India, published in 1976, encompassed clinical observations, analysis of nutrition history and socio-economic condition, and laboratory tests. These tests sought precise scientific evidence based on screening biochemical markers, such as measurements of hemoglobin, serum protein, and red and white blood cell levels, and on detecting associated diseases, like parasite infections, respiratory and gastro-intestinal diseases.[86] The German pediatrician Bruno Gans recounted his experience in Biafra in 1968 under an Oxfam medical team. Gans evaluated the nutrition and the degree of protein-calorie malnutrition of Biafrans based on hemoglobin levels.[87] The medical examination and employment of medical techniques is also evident in Gans' documentation of diagnostic tests, patients' bodily

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[82] Waterlow, "Childhood Malnutrition In Developing Nations: Looking Back And Looking Forward," 4, 7-8.
[83] Whitehead, "Biochemical Tests In Differential Diagnosis of Protein and Calorie Deficiencies," 479, 484.
[84] Ibid, 479-480.
[85] Ibid, 480, 483-484.
[86] Magotra, Sircar, and Katira, "Protein-Calorie Malnutrition," 10-12.
[87] Bruno Gans, "A Biafran Relief Mission," *The Lancet* 293, no. 7596 (1969): 660, 662.

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details, concomitant infirmities and conditions developed during the course of treatment.[88]

3.5.2 Inscribing Relief in a Medical Framework

Throughout the 1960s, experts continued to conceptualize hunger as a disease. One of the ways we can grasp this conceptualization was from experts' reference to it as an epidemic. Dr. McFie depicted the calamitous situation in late 1960 Bakwanga, Congo, where he encountered "quite simply an epidemic of kwashiorkor."[89] Dr. Foege, from the US National Communicable Disease Center, advocated for the implementation of epidemiological techniques in famine relief, since "famine is an epidemic of starvation that requires the same control methods as do epidemics of infectious diseases."[90] Another way this medicalization manifested itself was in scientists' view of malnutrition as just another medical condition. In Dr. Haigh's account of his work in a South-East Nigerian hospital in 1969, we note the juxtaposition of different diseases alongside malnutrition: "Almost all the population had, or had recently had, malaria, filaria, ascariasis, gastroenteritis, measles (in children), skin sepsis and scabies, and some form of malnutrition."[91]

From the 1950s to the 1970s, the practice of inscribing hunger relief in a medicalized approach that treated hunger alongside other conditions also persisted. In the

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[88] Ibid, 661, 663. A number of other studies discussed along this chapter are also attentive to examining the clinical and biochemical elements of the malnourished: R. A. Lewis et al., "Antibiotic Dietary Supplements in the Therapy of Childhood Protein Malnutrition," *The American Journal of Tropical Medicine and Hygiene* 5, no. 3 (1956): 483-495; V. Subrahmanyan et al., "Treatment of Nutritional Oedema Syndrome (Kwashiorkor) With a Low Cost Protein Food," *Indian Journal of Pediatrics* 24, no. 4 (1957): 113-114; Moisés Béhar et al., "Principles of Treatment and Prevention of Severe Protein Malnutrition in Children (Kwashiorkor)," *Annals of the New York Academy of Sciences* 69, no. 5 (1958): 959-960; Peel, "Practical Relief and Preventative Methods: Selective Feeding Procedures," 186, 188.
[89] John McFie, "With W.H.O. in the Congo," *The Lancet* 277, no. 7176 (1961): 551.
[90] Altman, "Famine Is Called Epidemic Disease," 18.
[91] H. Haigh, "Return to a Hospital in South-East Nigeria," *The Lancet* 293, no. 7600 (1969): 876.

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late 1950s, researchers from the Institute of Nutrition of Central America and Panama (INCAP) advocated "the routine use of an antibiotic such as penicillin during the first 8 to 10 days of hospitalization, since secondary infections are very frequent."[92] Dr. McFie, working in the Congo under the WHO in the early 1960s, recounted how the management of malnutrition included the provision of milk powder while it "tended to be of the "shotgun" type (to which we probably owe our large stocks of antibiotics); and perhaps excusably so when precise diagnosis is so difficult."[93] In a nutritional handbook elaborated for Oxfam, expert Sue Peel advised that children with severe malnutrition "should be given, on or shortly after admission, the following vitamins and medicines […] (i) An oral or I.M. dose of vitamin A […] (ii) an antimalarial, by mouth, (iii) a broad spectrum antihelmintic."[94] Peel also argued that medical personnel should perform the screening for identifying and determining the severity of the malnourished.[95]

The pediatrician Bruno Gans' recollections also shed light on how, within emergency contexts, the management of hunger continued to be integrated with the care of other medical conditions. In the outpatient clinic of the Queen Elizabeth Hospital in Biafra, Gans recounted how the children's individual cards had a listing of their prescribed regimens, which included items from milk and vitamins to pharmaceutical substances, such as kaolin, vermifuge and sulphonamide.[96] In this protocol, "The appropriate items were ringed by the nurses, and the child proceeded to two tents in one

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[92] Béhar et al., "Principles of Treatment and Prevention of Severe Protein Malnutrition in Children (Kwashiorkor)," 958.
[93] Shotgun therapy refers to the medical concept of administering multiple drugs in the attempt that at least one will be an effective treatment. McFie, "With W.H.O. in the Congo," 551.
[94] Peel, "Practical Relief and Preventative Methods," 188.
[95] Ibid, 180. Another good example of this medicalized view can be seen in a 1981 WHO manual: World Health Organization, "The Treatment and Management of Severe Protein-Energy Malnutrition," Geneva: World Health Organization, 1981, 5.
[96] Gans, "A Biafran Relief Mission," 661.

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of which food (i.e., made-up skimmed dried milk or a soya-bean/maize-milk mixture) was dispensed, whilst, in the other, lay hospital employees handed out the required medicaments under the guidance of the pharmacist."[97] Further, the medical team administered blood transfusions to repair biochemical imbalances in the malnourished body even as they resulted in widespread adverse reactions.[98] Here, we note the same postwar combination of food and technical fixes. In these relief schemes, as in as post-World War II relief projects, experts saw hunger as a disease, thus demanding treatment, often integrated with the care of other medical conditions, and to be conducted by medical and health professionals.

3.6 Nutritional Solutions

In line with the trends we have seen after World War II, the resort to technical solutions in responding to hunger carried on through the 1970s. In this period, solutions to hunger came in many forms: from the use of pharmaceutical substances and ordinary food to the creation of various new high-protein food products. We will firstly examine the continuing features of the regard of food as medicine, hunger relief as therapy, and the use of food and techno-scientific solutions. Then, we will explore what the protein-rich food mixtures tell us of the intersections of the paradigms of hunger.

3.6.1 Continuing Trends in Nutritional Solutions

Well into the 1950s, experts favored the employment of pharmaceutical substances, not just within a comprehensive regimen to combat concomitant conditions, but because of their value to counter hunger. A group of medical scientists conducted a

[97] Ibid.
[98] Ibid, 662.

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study in Bombay, India, to examine the benefit of administering "small doses of the broad spectrum antibiotics, chlortetracydline, oxytetracycline and tetracycline" to cases of malnutrition.[99] The study's report is striking in both its suggestion of the apparently beneficial use of antibiotics as "nutritional" or "food supplements" and in its use of a series of clinical and biochemical markers to gauge the patients' recovery.[100] This shows both the internal scrutiny into the malnourished body and the faith in scientific indexes and methods as providers of accurate and measurable outcomes. Many doctors followed with the administration of blood transfusions in the management of malnutrition, a practice that goes back to the 1930s.[101]

In the 1960s and 1970s, a more remarkable continuity was the scientific and aid community's persistent faith in therapeutic solutions to hunger at the same time that foods were prescribed as therapy. Researchers from the Institute of Nutrition of Central America and Panama advocated for "dietary treatment," on the basis of milk, and "As soon as appetite and tolerance permit[ted], the child should be given fruit juices, green and yellow vegetables, meat, eggs, and other foods necessary to give the balanced diet required for complete recovery."[102] The pediatricians Wharton, Jelliffe, and Stanfield considered protein and calories as "the basis of therapy," which, initially, largely called for administration "by gavage."[103] Interestingly, gavage means the forced administration of substances usually via a stomach tube. The doctors selected cow's milk as "the most

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[99] R. A. Lewis et al., "Antibiotic Dietary Supplements in the Therapy of Childhood Protein Malnutrition," *The American Journal of Tropical Medicine and Hygiene* 5, no. 3 (1956): quote in 484, also 495.
[100] Ibid, 485-489, 494-495.
[101] Béhar et al., "Principles of Treatment and Prevention of Severe Protein Malnutrition in Children," 958.
[102] Ibid, quote on 957, also 956.
[103] B.A. Wharton, D. B. Jelliffe, and J. P. Stanfield, "Do We Know How To Treat Kwashiorkor?" *The Journal of Pediatrics* 72, no. 5 (1968): 721.

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effective, economic, and convenient basis of dietary therapy."[104] Here, we see the convergence of multiple approaches: a biochemical view of food that disintegrated food into its nutrients, a recognition of food as the best response to hunger, and a medicalized lens that viewed food as a type of treatment and considered the use of invasive medical techniques for administering relief.[105]

While nutrition professionals agreed on the centrality of food, if designating it as a type of therapy, some experts underscored more directly the view of food as medicine. Dr. Gans gladly recounted that the nutritional and medical programs undertaken in besieged Biafra resulted in "every mother in Biafra" assimilating dried skimmed milk as a curing agent for kwashiorkor.[106] Hickman, a British doctor deployed as a medical relief worker under Save the Children after the end of the Nigeria-Biafra conflict, blended a medicalized view of hunger with the recognition that food was the appropriate response. Dr. Hickman recalled that "I soon realised that food was the important medicine […] The urgent need everywhere was for food."[107] Positively assessing that by mid-1970 the population's nutrition had improved throughout former Biafra, he stated that "Severe malnutrition had been largely eradicated."[108] In a nutritional handbook for Oxfam, expert Peel delineated that severe malnutrition required therapeutic feeding, consisting of

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[104] Ibid.
[105] Other examples of this recourse to therapeutic solutions and food as treatment include: Lewis et al., "Antibiotic Dietary Supplements in the Therapy of Childhood Protein Malnutrition," 483; Subrahmanyan et al., "Treatment of Nutritional Oedema Syndrome (Kwashiorkor) With a Low Cost Protein Food," 112; C. Gopalan, "Long Term and Emergency Solutions for Protein-Calorie Deficiencies," *The Journal of Tropical Pediatrics and African Child Health* 9 (1963): 69; Whitehead, "Biochemical Tests In Differential Diagnosis of Protein and Calorie Deficiencies,", 479; and Derrick Jelliffe, "Emergency Feeding of Young Children," *The Journal of Pediatrics* 75, no. 1 (1969): 154.
[106] Gans, "A Biafran Relief Mission," 662.
[107] Roger Hickman, "The Relief Operation in Former Biafra," *The Lancet* 296, no. 7677 (1970): 815-816.
[108] Ibid, 816.

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"special food" in a regimen of "at least four feeds a day of a high energy mixture."[109] In this protocol, medical personnel needed to emphasize "the value of the food as a medicine," when, however, the special food was nothing extraordinary: simply a high energy milk made of dried skim milk, sugar, oil, and water that, when possible, should be complemented with electrolytes (potassium chloride and magnesium hydroxide). Perhaps its singularity lay in the need for precise recipes that accurately calculated the ingredients and quantity of intake based on the child's weight, nutrient requirements and regularity of feeds.[110]

3.6.2 Protein-Rich Food Mixtures

Since the PAG's inception in 1955, the expert group sought to advise and stimulate the research and production of protein-rich foods to combat malnutrition, eyeing especially "unconventional sources of protein" that could prove to be low-cost alternatives for developing countries.[111] The international scenario's focus upon the world protein gap functioned as a catalyst for the rise and international fervor of the development of protein-rich foods to relieve malnutrition.[112] The impetus behind the surge of high-protein foods to manage hunger also derived from a shortage of the international supply of dried milk. When in 1959 the US government decided to redirect its dried milk surpluses for "other uses that had legislational priority," international agencies and organizations shifted efforts to the research and provision of other protein

[109] Peel, "Practical Relief and Preventative Methods: Selective Feeding Procedures," 186.
[110] Ibid, 186-187, 195.
[111] Nevin S. Scrimshaw, "Foreword," in *The Use of Protein-rich Foods for the Relief of Malnutrition in Developing Countries: An Analysis of Experience*, by Elizabeth Orr (London: Tropical Products Institute, 1972), v-vi.
[112] Orr, "The Contribution of New Food Mixtures to the Relief of Malnutrition," 2.

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sources and nutrition strategies.[113] The reduction of the available supply of dried milk for humanitarian agencies denotes how politico-economic decisions and the global commercial network influenced humanitarian organizations' management of hunger.

Protein-rich food schemes were largely borne from four processes. The FAO, WHO and Unicef, in collaboration with developing countries' governments, stimulated the development of protein-rich food schemes. Universities and research centers in developing countries, many times in association with the UN agencies, contributed to initiating protein-rich food projects through nutritional assessment surveys, experimentation of materials, or the development of products that were then commercialized by private companies. The UN agencies participated in these initiatives in various ways, from financial support and the provision of equipment and materials to technical advice.[114] Private initiative was also a driving engine of the process, and large multinational companies spearheaded many of these protein-rich food schemes, such as Quaker Oats, Nestlé, Glaxo, and General Mills, while local companies also participated in a number of projects.[115] International and local non-profit organizations fueled the protein-rich foods market with their purchase and distribution of these products in their projects.[116]

The market was thus a central component in shaping emergency foods designed to counter hunger. Scott-Smith wisely demonstrated how hunger and commerce are co-produced. The monoculture and industrially-intensive agricultural regime and global

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[113] Ruxin, "Hunger, Science and Politics," 139.
[114] Elizabeth Orr, *The Use of Protein-rich Foods for the Relief of Malnutrition in Developing Countries*, 33-35, 42-43.
[115] Ibid, 34-35. Some examples can be found on pages 7, 9-14, 17-19, 22.
[116] Ibid, 42-43.

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network of food structurally produce hunger. At the same time, hunger also produces commerce, both in stimulating the development of relief foods and in consolidating a space for these specific products aligned to a modern global agricultural system.[117] After World War II, the market's influence over hunger solutions was only beginning to flourish. Relief foods in the postwar were mainly borne out of the improvised use of medicinal products and foods.[118] In the 1960s and 1970s, the market's influence assumed a more prominent role in designing and prescribing solutions to hunger. In the case of the US, for example, protein-rich blended flours were an outlet for agricultural surpluses, and a mechanism for securing geopolitical interests and for opening up new markets.[119] In fact, from the post-war onwards, donor countries' interests in disposing of surpluses and cultivating potential markets largely dictated the international food aid system.[120] Further, most of these relief foods were made of industrial processes' residue.[121] The market's entanglement with these protein-rich food mixtures is also evident in their promotion with specific marketing strategies and through strategic locations, such as clinics and hospitals, to educate and persuade the poor as well as humanitarian agencies.[122]

The Central Food Technological Research Institute in Mysore, India, was founded in 1950, aiming to ameliorate the population's general state of "semi-starvation" and to enhance the nutritional composition of the Indian diet through the application of technological research.[123] The Institute soon became a hub of food technology, by

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[117] Scott-Smith, "Defining Hunger, Redefining Food," 199-202, 228.
[118] Ibid, 204-205.
[119] Ibid, 221-222, 227.
[120] Ruth Jachertz and Alexander Nutzenadel, "Coping with Hunger? Visions of A Global Food System, 1930-1960," *Journal of Global History* 6 (2011): 117-118.
[121] Scott-Smith, "Defining Hunger, Redefining Food," 205-206.
[122] Ibid, 207-209, 216-217.
[123] Parpia and Subrahmanyan, "Some Aspects of the Utilization of Food Research in India," 1, 12.

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providing technical advice, manufacturing products and designing processes, products, and techniques of food preservation, storage and processing for the national industry while also staying attentive to international proceedings.[124] Beginning in the late 1950s, the Central Food Technological Research Institute in Mysore, India, explored ways to concoct low cost protein foods for the management of malnutrition. One of these was the Indian Multipurpose Food, Formula C, a "mixture of low fat groundnut flour, (60 parts), Bengal gram *dhal* (20 parts) and skim milk powder (20 parts) and fortified with calcium and vitamins."[125] In 1968, the Institute developed Bal-Ahar, a mixture of "wheat flour, edible groundnut flour and skim milk powder or Bengal-gram flour," with added vitamins and minerals.[126] Indian Multipurpose Food and Bal-Ahar could then be mixed with different spices and/or oil to make different recipes such as porridge, *kesari bath* (pudding), and *uppamav* (savoury dish).[127] Besides cheap protein foods such as the Indian Multi-Purpose Food and Bal-Ahar, the Institute ingeniously developed foods, such as the "low curd-tension infant food from buffalo's milk," groundnut vegetable milk, and a hydrolyzed soybean protein paste.[128] It also designed and produced substitute foods in place of cereal crops, such as the *tapioca macaroni*, composed of tapioca flour, wheat semolina and groundnut flour; *mysore flour*, consisting of tapioca and groundnut meal; and *nutro flour*, made from wheat flour, tapioca flour and groundnut flour.[129]

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[124] Ibid, 2-6, 8-9, 11.
[125] V. Subrahmanyan et al., "Treatment of Nutritional Oedema Syndrome (Kwashiorkor) With a Low Cost Protein Food," quote on 112, original emphasis, also 113-114.
[126] G. Prasannappa et al., "Precooked Bal-Ahar and Indian Multi Purpose Food," *Journal of Food Science and Technology* 9, no. 4 (1972): quote on 174, also 175.
[127] Ibid, 175.
[128] Parpia and Subrahmanyan, "Some Aspects of the Utilization of Food Research in India," 7-8.
[129] Ibid, 4-5, 9.

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The 1960s and 1970s gave rise not only to these various protein mixtures, but also to fortified blended flours and technically-engineered creations. This was the moment of the rise of the now widely used fortified blended flours. Made of precooked cereal and/or pulses mixtures and enriched with vitamins and minerals, they proliferated in many forms, such as Corn-Soy Milk (CSM), Corn-Soy Blend (CSB), Wheat-Soy Blend (WSB), and Wheat-Soy-Milk (WSM), and have since consolidated as a central element in humanitarian nutrition.[130] The ready-made blend aligned to economic imperatives and nutritional experts' search for a complete, economical, nutritionally-balanced solution that would foremost meet specific nutritional requirements at the expense of enabling receivers of aid freedom of choice over their foods.[131] The search for high-protein solutions also encompassed attempts at synthetically enriching cereals and products with amino acids or at crafting leaf protein, seaweed and algae-based products.[132] Fish Protein Concentrate (FPC), a dry fish powder, was devised in the mid-1950s as an additional ingredient to increase the food's amount of protein. It was successfully added to bread in South Africa, and seen as promising for the installation of fish meal processing plants in Third World countries.[133] Further, scientific trials "verging on science fiction" were attracted by the potential of "unlimited man-made protein production." Scientific designs, considerably aided by the investment of oil companies, explored "the prospect of producing edible protein by growing single-cell organisms on natural gas, petroleum,

[130] Tom Scott-Smith, "Beyond the 'Raw' and the 'Cooked': A History of Fortified Blended Foods," *Disasters* 39, no. 2 (2015): 244; Scott-Smith, "Defining Hunger, Redefining Food," 194-195.
[131] Scott-Smith, "Defining Hunger, Redefining Food," 177, 227; Scott-Smith, "Beyond the 'Raw' and the 'Cooked'," 256.
[132] Alan D. Berg, "Malnutrition and National Development," 131, 133.
[133] Carpenter, *Protein and Energy*, 163-167.

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vegetable wastes or even coal."[134] As Scott Smith argued, these endeavors attest that the 1950s to the mid-1970s were a period of the great influence of high modernism in humanitarian nutrition, marked by "the lionisation of science, the taming of nature, and an emphasis on elitist planning."[135] These protein-rich food mixtures were thus borne from a modernist vision that placed significant emphasis on new, technically-engineered products, designed with scientific precision and expertise.[136]

As the 1960s progressed, the scientific community increasingly began to focus on malnutrition as both a protein *and* calorie problem. The reconfiguration in the prominent scientific paradigm informing the conceptualization of hunger also impacted responses to hunger. The first protein-rich foods, for example, had a much higher proportion of protein, whereas, after the mid-1960s, the new focus on malnutrition led to the formulation of protein-rich products with greater caloric contents.[137] In the late 1960s, the pediatrician Jelliffe reminded the aid and scientific community that it was "wasteful of time, energy, money, and resources to distribute expensive protein foods, especially those of animal origin, when calorie requirements are not covered."[138] By 1972, the development and production of protein-rich foods had thrived and waned. Some attempts were very short lived (less than one year long), while others endured for longer but also ended by the 1970s. Some schemes reached regular production and some new endeavors

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[134] Berg, "Malnutrition and National Development," 133. In his PhD dissertation, Scott-Smith undertook a comprehensive and detailed research of protein-rich foods. For a more expanded discussion of this topic, see Tom Scott-Smith, "Defining Hunger, Redefining Food: Humanitarianism in the Twentieth Century" (PhD diss., University of Oxford, 2014), Chapter 5 and Chapter 6.
[135] Scott-Smith, "Defining Hunger, Redefining Food," 166.
[136] Ibid, 167-168.
[137] Orr, *The Use of Protein-rich Foods for the Relief of Malnutrition in Developing Countries*, 37.
[138] Jelliffe, "Emergency Feeding of Young Children," 153.

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were even at an exploratory stage in the early 1970s.[139] Nonetheless, by the mid-1970s, most of the frenzy around protein projects dwindled and most projects around the world, from fish protein concentrate to single-cell organisms, failed or were terminated.[140] After the mid-1970s, the UN agencies turned to focus on stimulating the use of home-made weaning foods assembled from local ingredients. This coupled to the growing acknowledgment and adoption by developing countries of a "multi-faceted" approach where the response to malnutrition was inserted in a "national food and nutrition policy and programme."[141] We will now explore how this demise of the protein gap came about: it was not so much a radical paradigm shift, but a reorganization of the scientific consensus' emphasis that still retained features of medicalization and a biochemical understanding of nutrition.

3.7 The Changing and Concurrent Scientific Paradigms of Hunger

Beginning in the late 1960s, a political tug-of-war between the PAG and the FAO, in dispute of scientific authority, slowly undermined the PAG's influence among the UN agencies.[142] This coupled to an international scenario that, after the mid-1970s, saw the scientific decline of the protein paradigm, the fall of the idea of a world protein gap, and the UN's acknowledgement that "the food supply, not protein" constituted "the real problem."[143] Cultural changes also played a part in displacing the preeminent protein paradigm. From the 1970s popular skepticism of industrially and technically processed foods to a movement in the development field favoring local and community-inclusive

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[139] Orr, *The Use of Protein-rich Foods for the Relief of Malnutrition in Developing Countries*, 7-32.
[140] Scott-Smith, "Defining Hunger, Redefining Food," 192-193; Orr, *The Use of Protein-rich Foods for the Relief of Malnutrition in Developing Countries*, 48.
[141] Orr, "The Contribution of New Food Mixtures to the Relief of Malnutrition," 10.
[142] Semba, "The Rise And Fall of Protein Malnutrition in Global Health," 83-84.
[143] Ibid, 84.

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initiatives, aid responses distanced from "top-down, centralised, modernist planning" designs.[144] Further, the predominance of nutrition experts in policy making waned in the 1970s. Ruxin noted that the weakening power of nutritional science experts in the 1970s speaks to a larger trend in socio-political and development areas that placed emphasis on management, was more preoccupied with implementation than formulation, and was skeptical of expert opinion.[145] This translated practically, for instance, in a broadening of nutrition groups' composition to include experts in economy, agriculture and planning.[146]

By the early 1970s, the predominant scientific consensus saw malnutrition as both a calorie and protein deficiency, reasoning that a lack of energy would lead to the body's inadequate utilization of protein.[147] Instead of the preoccupation with the protein deficit, the scientific consensus began to lean towards the belief that "Lack of nutriment in general with an *energy gap rather than a protein gap is the crux of the matter*."[148] Donald McLaren's 1974 article "The Great Protein Fiasco" was largely heralded as the moment when the "protein dogma" was dismantled.[149] McLaren, a British pediatrician who worked for many years at the American University in Beirut, had been a fervent critic of the disproportionate attention of the international community on protein malnutrition and the erroneous circumscription of malnutrition to protein deficiency.[150] Dismounting the scientific dogma of a protein gap led both to the weakened credibility of nutritional

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[144] Scott-Smith, "Defining Hunger, Redefining Food," quote on 194, also 193.
[145] Ruxin, "Hunger, Science and Politics," 333, 339-341, 343
[146] Ibid, 335-336.
[147] Orr, *The Use of Protein-rich Foods for the Relief of Malnutrition in Developing Countries*, 1.
[148] McLaren, "The Great Protein Fiasco," 95, my emphasis; J.C. Waterlow and P.R. Payne, "The Protein Gap," *Nature* 258, no. 5531 (1975): 117.
[149] Scott-Smith, "Defining Hunger, Redefining Food," 192-193.
[150] Ruxin, "Hunger, Science and Politics," 109-110; McLaren, "The Great Protein Fiasco," 93-94.

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science and a moment of disorientation among health and development professionals.[151] The scientific community reorganized around an energy rationale, and the concept of protein-energy malnutrition came to permeate nutrition and scientific circles from the early 1980s onwards.[152]

The emergence of another prevailing scientific view does not mean that the protein paradigm was all-encompassing or that its demise propelled the rise of a diametrical canon. In fact, it attests both to the coexistence of different scientific paradigms and to the continuance of medico-scientific explanatory frameworks. Amidst the apex of the protein-calorie malnutrition tenet and schemes, not all experts subscribed to the dominant scientific understanding favoring protein deficiency. Aside from McLaren's prominent dissenting voice, others also questioned the medical concept's representativeness and the existence of a protein gap.[153] It was McLaren's experience in the Middle East, where marasmus was the predominant form of malnutrition, that provided him with a "fresh look at the pathogenesis of these conditions" and shaped his vehement criticisms.[154] McLaren's contentions, therefore, were still firmly entrenched in a medical and scientific view of hunger.[155]

Scientific contention was rife not only in these debates around the appropriate conceptualization of malnutrition. Doctors, all around the world, used different regimens

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[151] A.S. Truswell, "Protein Versus Energy in Protein Energy Malnutrition," *South African Medical Journal* 59, no. 21 (1981): 753.
[152] Ibid, 753-755; G.A.O. Alleyne et al., *Protein-energy Malnutrition* (London: Edward Arnold, 1977); World Health Organization, "The Treatment and Management of Severe Protein-Energy Malnutrition," 7.
[153] McLaren, "The Great Protein Fiasco," 93-94; Donald McLaren, "The Great Protein Fiasco Revisited," *Nutrition* 16, no. 6 (2000): 464.
[154] Donald McLaren, "A Fresh Look at Protein-Calorie Malnutrition," *The Lancet* 288, no. 7461 (1966): 486; McLaren, "The Great Protein Fiasco," quote on 93.
[155] McLaren, "A Fresh Look at Protein-Calorie Malnutrition," 485, 488.

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for managing kwashiorkor.[156] The divergences, for example, concerned the clinical variations, the appropriate protein and calorie amounts, and which minerals, in what amount, and through which routes of administration needed to be provided to optimize recovery. Different practices also revolved around the benefits of and when blood transfusions were necessary, whether intravenous hydration solutions were necessary, whether vitamin preparations were essential, whether and which antibiotics should be prescribed, and whether some conditions, such as diarrhoea or tremors, had any connection to the regimen applied.[157] Béhar and his research group also noted scientific divergences on the amount of fat prescribed in recovery regimens.[158] Further, alongside the stimulus for the commercial production of protein foods, many advocated for and implemented mixtures from local foods in child feeding.[159] Scientists even began to question the use of small and multiple feedings in the management of hunger, pondering if this consolidated medical practice was "pediatric folklore": "is the *gradual* introduction of protein by giving feedings of increasing strength, as widely practiced, merely so much pediatric folklore, or should the full protein dose be introduced immediately, as in Uganda?"[160]

These different approaches, however, were still largely inscribed in a medicalized framework. From the 1930s and with increasing sophistication in the 1960s, the scientific establishment recommended various biochemical tests for diagnosing malnutrition, while the consensus in the 1970s began to move toward "somatic measurements," such as

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[156] Wharton, Jelliffe, and Stanfield, "Do We Know How To Treat Kwashiorkor?" 721-722.
[157] Ibid, 721-724.
[158] Béhar et al., "Principles of Treatment and Prevention of Severe Protein Malnutrition in Children," 956.
[159] McLaren, "The Great Protein Fiasco," 94.
[160] Wharton, Jelliffe, and Stanfield, "Do We Know How To Treat Kwashiorkor?" 721, original emphasis.

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"weight, height, head circumference, and mid-arm circumference."[161] In the shift towards an emphasis on the "energy gap," experts remained concerned with and intrigued by determining how nutritional interventions could meet the specific dietary requirements of children.[162] Finally, the validity of a scientific framework endured in the thought that the conceptualization and measures to manage kwashiorkor based on medical knowledge were not inadequate; rather, the mistake came from the assumptions of kwashiorkor's wide prevalence.[163]

From the different approaches on how to manage malnutrition to scientific contention on its appropriate conceptualization, these divergences underscored the existence of multiple and coeval paradigms governing the conceptions and responses to hunger. Further, if the mid-1970s seemed to signal changing frameworks and practices in humanitarian nutrition, many features endured. Even as international nutritional groups widened their panel of expertise, the presence and influence of nutrition experts never entirely disappeared.[164] From humanitarian actors' continued attraction to precise and mobile concoctions and the allure of scientifically-engineered products, high modernism has left "an enduring legacy, an indelible mark on policy."[165] The confluence of these different paradigms of hunger, combined with the plural lenses that viewed hunger, such as medical, politico-economical, and critical frameworks, manifested in many experts' accounts. I will close this chapter with a look at this entanglement to argue that there was

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[161] McLaren, "The Great Protein Fiasco," 94-95.
[162] Ibid, 95.
[163] In the words of the avid critic of protein malnutrition, Donald McLaren, "If childhood malnutrition throughout the world had consisted of kwashiorkor due to protein deficiency, there would have been no fiasco, for the measures taken to identify and combat it would have been appropriate. The entire edifice was built upon erroneous worldwide generalisations made from correct but limited observations in atypical situations such as rural Africa." Ibid.
[164] Ruxin, "Hunger, Science and Politics," 336, 343.
[165] Scott-Smith, "Defining Hunger, Redefining Food," quote on 194, also 168-169, 195.

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never only one way to conceive of hunger; rather, different paradigms mixed with differing views on hunger, resulting both in a reliance and faith in techno-scientific solutions, and in acknowledgements of hunger's complex and holistic causes.

3.8 Comprehensive Outlooks, Technical Inclinations

Researchers from the Institute of Nutrition of Central America and Panama envisioned the larger roots of hunger while combining a medicalized view of the problem: "there are a number of factors that limit the consumption of cow's milk in areas where the *kwashiorkor syndrome* occurs […] principally, the *inadequate production and high cost of milk* […] The high cost of milk prevents its sufficient use by low-income families in areas where *kwashiorkor is endemic*."[166] They employed even broader lenses into proposing solutions to hunger when considering the need for nutrition education, environmental sanitation, and the control of communicable diseases, though such suggestions were still permeated by a paternalist mindset that judged the population's "ignorance and food prejudices."[167] These researchers both recognized the value of locally-sourced food, while still maintaining that science retained the knowledge to craft nutritionally-balanced solutions:

> It would be desirable to devise a product that could be prepared in the home from local raw materials. This is scarcely practicable, since special knowledge and skill are required to combine vegetable proteins in the right proportions, and since many of the cheapest and best protein sources cannot be used directly for food without special processing. We believe, therefore, that vegetable protein mixtures designed for the prevention of kwashiorkor must be manufactured from low-cost ingredients within the agricultural resources of each region.[168]

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[166] Béhar et al., "Principles of Treatment and Prevention of Severe Protein Malnutrition in Children," 960-961, my emphasis.
[167] Ibid, 965-966.
[168] Ibid, 962.

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This more comprehensive understanding of hunger coexisted with a medicalized and biochemical view of hunger: "*protein* administration must be the *central point of any rational therapy* even though appropriate amounts of all other nutrients should obviously be given for best therapeutic results."[169]

The Indian Central Food Technological Research Institute also combined a comprehensive and socio-culturally sensitive approach to a scientific exaltation. It acknowledged the chronic state of the population's malnutrition and recognized the need to make solutions acceptable to "the villager" and adapted to local food habits, at the same time that it dismissed "miraculous results," since the Indian food situation demanded "slow protracted effort and extensive ground work."[170] In spite of this perceptive outlook, the Institute exalted scientific and technical solutions by emphasizing the role of scientists and technologists in the management of hunger. Further, this bearing of scientific knowledge had paternalist undertones: "The traditions and superstitions of centuries cannot be altered overnight, even if such an alteration is scientifically beneficial."[171] The socio-cultural awareness and the incorporation of local practices meshed with the endorsement of scientifically engineered solutions. This is evident in the Institute's establishment of a rural extension program that would test the products and deliver demonstrations suited to the population's local milieu.[172]

Alan Berg, an American nutrition expert hailed internationally for furthering and consolidating nutrition in US government programs and the international development

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[169] Ibid, 960, my emphasis.
[170] Parpia and Subrahmanyan, "Some Aspects of the Utilization of Food Research in India," quote on 11, also 1, 8.
[171] Ibid, 8.
[172] Ibid, 8-9.

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agenda, acknowledged the complex task of countering malnutrition even as he highlighted the primacy of technology in this process.[173] Berg highlighted as barriers the lack of governments' engagement in ensuring adequate nutrition, the gap of information among scientists, policy makers and food industrialists, and the disconnect between experts, often restricted to their own disciplinary boundaries. Therefore, by emphasizing political shortcomings and programmatic difficulties while voicing that "technologically, malnutrition *can* be overcome," the structural inequalities fostering hunger were obscured.[174] Bringing a dissenting view to the protein paradigm, McLaren also shared an outlook that was both comprehensive, but medicalized. McLaren traced some of the neglected "root causes" of the nutritional problem to early weaning and widespread diarrheal diseases.[175] He also ascribed nutrition to secondary importance in malnutrition and more specifically in the case of marasmus, highlighted a "multifactorial aetiology [where] poverty, ignorance, bad housing, poor hygiene, and lack of family planning all conspire."[176] In this way, though viewing malnutrition as demanding more than only nutritional solutions, McLaren still inscribed it in a broad medicalized framework, viewing the society as an arena for public health but also as a target of medical intervention.[177]

Elizabeth Orr, a researcher from the British Tropical Products Institute, in compiling a report of the work on protein-rich foods, combined a biochemical, critical

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[173] James Levinson, "Vital to the Creation: Interview with Alan Berg," *Development* 56, no. 1 (2013): 24; Berg, "Malnutrition and National Development," 135-136.
[174] Berg, "Malnutrition and National Development," quote on 136, original emphasis, also 135.
[175] McLaren, "A Fresh Look at Protein-Calorie Malnutrition," 487-488.
[176] McLaren, "The Great Protein Fiasco," 95.
[177] McLaren stated: "Today the malnutrition of early childhood as typified by marasmus is symptomatic of a sick and bewildered segment of urbanising and modernising society, rootless and insecure. *The whole society is the patient*." McLaren, "A Fresh Look at Protein-Calorie Malnutrition," 488, my emphasis.

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politico-economical, and paternalist view of hunger. Orr asserted that the "primary cause of protein deficiency in populations as a whole" was dietary imbalance, while conceding that nutritional ignorance of vulnerable groups' special requirements, and religious or traditional food taboos contributed to worsening protein-calorie malnutrition. However, she concluded that, "the basic cause of protein malnutrition in most areas is lack of income."[178] In this sense, Orr acknowledged that the "fundamental solution to the protein problem is therefore economic development in the broadest sense of the term, to raise per capita incomes in the poorer countries and at the same time to increase the supply of products of particularly high nutritive value."[179] She combined plural lenses in the response plan by designating hunger as "the protein problem," reinforcing the importance of nutritional knowledge in determining rich diets, and envisioning economic autonomy as "the fundamental solution." All these examples attest to how multiple and competing lenses could mesh together to make sense of the problem and inform the conceptualization and response to hunger, while experts consistently voiced the value of technically-engineered solutions.

3.9 Conclusion

The medicalization of hunger from the late 1950s to the late 1970s focused upon a different terrain and featured substantially more varied actors. The scientific focus shifted to developing countries and childhood malnutrition. The protein paradigm and increasing scientific attention to children's vulnerability increasingly placed children in the spotlight of nutritional and humanitarian attention in the post-World War II era. The shifting

[178] Orr, *The Use of Protein-rich Foods for the Relief of Malnutrition in Developing Countries*, 2-3.
[179] Ibid, 3.

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geography of hunger contributed to a rise of Western nutrition researchers in developing countries and elevated the involvement of experts from developing countries in the international scene. The global character of nutritional and medical knowledge was evident in the scientists' specializations abroad, the scientific exchanges and encounters of Western and local researchers, the role of nationally-diverse experts in international nutrition groups, and the complex web of the production of knowledge. It was this global production that both reinforced Western precepts in applying them across the world and contested scientific consensuses by highlighting hunger as a geographically-mutable condition with specific local manifestations.

I have traced the instances of continuity in the medicalization of hunger from the late 1950s to the late 1970s. The medical scrutiny into the hungry body, the view of hunger as disease, and the view of food as medicine persisted. Another enduring feature was the experts' belief that the management of hunger demanded therapy, which perpetuated the mutation of hunger relief into treatment. We also continued to note nutritional solutions that meshed the provision of food with the use of more techno-scientific solutions. These ranged from pharmaceutical substances as nutritional supplements to the creation of protein-rich food concoctions, such as fortified blended flours, vegetable mixtures, and even eccentric designs of leaf protein, fish protein concentrate, and single-cell organisms. In the 1960s and 1970s, the era of high modernism strongly permeated humanitarian nutrition, with the exaltation of technically-engineered products and trust in scientific expertise. Amidst this context, the market definitively established its centrality in designing and prescribing emergency foods.

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If the 1960s saw the apex of the protein paradigm and a surge in high-protein solutions, the late 1960s already saw a scientific move towards focusing more attention on the importance of calories in the workings of malnutrition and in management regimens. By the mid-1970s, the protein paradigm was largely displaced from the nutritional spotlight. The PAG increasingly lost influence from the late 1960s until its dismantlement in 1977, most protein schemes were discontinued or failed, and the scientific community re-centered its focus on energy and calories.[180] Responses to hunger began to move toward horizontal programs of national development, at the same time that many experts continued to advocate for "magic bullet solutions" to hunger. From World War II until the early 1970s, nutrition knowledge was mainly tied to nutrition experts largely with a medical background. The 1970s saw a more diversified composition of the nutrition field: while nutritionists and doctors remained present, experts on economy, agriculture and social sciences increasingly integrated nutrition forums and bodies.[181]

Other enduring features also persisted in spite of the re-orientation in the scientific consensus towards calories. Humanitarian nutrition remained captivated by techno-scientific solutions to hunger that could ensure nutritionally-precise, efficient, mobile and durable responses.[182] The plural lenses that inflected one's view of the world food problem and hunger, coupled to concurrent scientific paradigms, tell us there was never only one way to make sense of hunger. Experts could acknowledge the more structural causes of hunger, but continued to rely on and trust techno-scientific solutions. If there were divergences on the conceptualization and management protocols of hunger,

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[180] Semba, "The Rise and Fall of Protein Malnutrition in Global Health," 85; Truswell, "Protein Versus Energy in Protein Energy Malnutrition," 753.
[181] Ruxin, "Hunger, Science and Politics," 111, 242, 336, 343.
[182] Scott-Smith, "Defining Hunger, Redefining Food," 168-169, 194-195.

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approaches continued to be mainly inscribed in a medico-scientific framework. The next chapter's trajectory into contemporary times will show how a medical paradigm and a resort to technical nutritional solutions remain entrenched in hunger research and humanitarian nutrition practices.

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Chapter 4

"Food is Not Enough": Ready-to-Use Therapeutic Foods as a Humanitarian Lifeline[1]

4.1 Introduction

This final chapter marks the end point of my historical examination of the medicalization of hunger, entering the 1990s and 2000s and concluding with reflections on the current humanitarian architecture of hunger. I seek to explore the contemporary humanitarian management of hunger, focusing particular attention on the recent surge of ready-to-use therapeutic foods (RUTFs) in a far-reaching frame of hunger and humanitarianism. The deeper intent of this research is to question why medicalized solutions are positively inscribed in humanitarian efforts and to probe the implications of a predominantly scientific framework in relieving malnutrition. In reaching to the intersections of history and science for a nuanced look at humanitarian relief products that considers both politico-economic and socio-cultural elements, I aim to contribute to an incipient literature by examining which conceptions guide the promising use of these products in humanitarianism and the entailing impacts of technologized responses.[2]

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[1] The title makes reference to the Doctors Without Borders/Médecins Sans Frontières (MSF) document that inspired this chapter: "FOOD IS NOT ENOUGH: Revolutionary Malnutrition Treatment Available Now, But Out of Reach for Millions of Children," Press Teleconference Transcript, 2007, https://www.doctorswithoutborders.org/sites/usa/files/MSF-Press-Teleconference-Transcript.pdf.

[2] This study is inspired by and benefits greatly from the recent contributions of Peter Redfield and Tom Scott-Smith: Peter Redfield, "Bioexpectations: Life Technologies as Humanitarian Goods," *Public Culture* 24, no. 166 (2012): 157–184; Tom Scott-Smith, "Sticky Technologies: Plumpy'nut®, Emergency Feeding and the Viscosity of Humanitarian Design," *Social Studies of Science* 48, no. 1 (2018): 3-24; Tom Scott-Smith, "The Fetishism of Humanitarian Objects and the Management of Malnutrition in Emergencies," *Third World Quarterly* 34, no. 5 (2013): 913–928.

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This chapter is organized around three different moments. In the first instance, I address the context of the 1990s, which saw an international re-emphasis on childhood malnutrition. This analysis delves into the continuance of coexisting nutritional paradigms and into the global webs of nutrition knowledge. Nutrition groups in international organizations evidence a diverse make-up of expertise, both in their geographical origins and in the breadth of specialization areas. I then discuss the process of formulation of Plumpy'Nut®, the first and most prominent RUTF, patented by the French company Nutriset, and made from peanuts, vegetable fat, sugar and skimmed milk powder, with an added vitamin and mineral mix. Especially modelled to recover the malnourished child, this blend of plain foodstuffs does not appear, at first sight, to be a magical concoction. However, nutritionists and aid organizations have heralded it as a "true revolution" over the previously prevalent therapeutic milks directed at treating severe acute malnutrition in children.[3] The fact that the pioneer researchers of RUTFs had medical backgrounds and the continued presence of professionals of medicine and natural sciences in international nutrition forums sheds light on the transdisciplinary character of the field of nutrition and the lasting influence of medico-scientific professionals.

The subsequent sections focus on the dissemination and application of RUTFs through the perspective of the international non-governmental and humanitarian

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[3] This expression is taken from Nutriset's website: Nutriset, "Plumpy'Nut®," accessed February 2, 2019, https://www.nutriset.fr/products/en/plumpy-nut.
Some examples of this revolutionary and novel portrayal of Plumpy'Nut® can be seen in: André Briend, "Highly Nutrient-Dense Spreads: A New Approach to Delivering Multiple Micronutrients to High-Risk Groups," *British Journal of Nutrition* 85, Suppl. 2 (2001): S175-S179; Jonathan Clayton, "Africa's Miracle Food: Plumpy'nut," Médecins Sans Frontières, August 12, 2005, accessed January 30, 2019, https://www.msf.org/africas-miracle-food-plumpynut; Elizabeth Kiem, "UNICEF Readies for Food Crisis with Unique Basket of Solutions for Children at Risk," UNICEF, May 28, 2008, accessed January 30, 2019, https://www.unicef.org/nutrition/index_44186.html; Marion Hart, "The Malnutrition Miracle: What is Ready-to-Use Therapeutic Food?" UNICEF USA, November 1, 2016, accessed January 30, 2019, https://www.unicefusa.org/stories/malnutrition-miracle-what-ready-use-therapeutic-food/30730.

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organization Médecins Sans Frontières (MSF). I examine MSF's response during the 2005 Niger famine and its subsequent international advocacy in favor of expanding the use of RUTFs in the management of childhood malnutrition. MSF became an outspoken proponent for the application of RUTFs following its mass deployment in the 2005 Niger famine. The organization's advocacy shaped international humanitarian practice and culminated in its widespread international endorsement in 2007.[4] MSF has complex mechanisms of governance and deliberation, and the scope of this chapter would never fairly assemble an exhaustive analysis of the debates surrounding RUTFs within the organization.[5] My aim is, rather, to probe what specific documents released by MSF reveal about ways of conceptualizing hunger, the suitability of RUTFs for its management, and the broader contours of humanitarianism. With this in mind, I first address the lingering features of the medicalization of hunger, especially remarking the medical frame that guided scientific studies and international guidelines, and how this shaped the responses to the 2005 Niger famine. The last section probes what RUTFs reveal about contemporary humanitarian designs, with an emphasis on the child's place in humanitarian nutrition and the limitations of MSF's political stances.

This chapter carries two principal arguments. First, I will show how the medicalization of hunger remained entrenched as a significant explanatory lens from the

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[4] World Health Organization, World Food Programme, the UN System Standing Committee on Nutrition and the United Nations Children's Fund, "Community Based Management of Severe Acute Malnutrition: A Joint Statement by the World Health Organization, the World Food Programme, the United Nations System Standing Committee on Nutrition and the United Nations Children's Fund," 2007.

[5] The anthropologist Peter Redfield, in his comprehensive research of MSF's action ethos, pointed out the extensive volume and fragmentary nature of MSF's materials and publications, many of them scattered through the records of different operational centers and restricted from the public domain. Further, Redfield remarks on MSF's "culture of internal argument and critical reflection," which indicates both the vastness of available resources and their contentious deliberation.
Peter Redfield, *Life in Crisis: The Ethical Journey of Doctors Without Borders* (Berkeley: University of California Press, 2013), 1, 4-5.

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1990s onwards. With scientific studies and international guidelines continuing to fix a medical gaze onto the hungry body, a medical view facilitated a persistent regard for hunger as disease. The medicalization is furthered by the fact hunger was still placed alongside other diseases and integrated in medical protocols of disease management. Plumpy'Nut® demonstrates the mutation of food into medicine and the continuous regard for the management of hunger as treatment, even when the product transferred the primary site of care to the home place.

Second, I question the novel and revolutionary character of Plumpy'Nut®, while also exploring what views and actions are facilitated with the employment of technocratic responses to hunger. As a product of technical and nutritional expertise, Plumpy'Nut® fits into the larger lineage of scientifically-engineered solutions to hunger. The product's nutritionally-balanced composition and individual commercial packaging lionizes science and industry at the expense of socio-cultural specific approaches. This evidences humanitarianism's technocratic character, where the need for urgent and large-scale action favors a limited and medicalized management of malnutrition and places specific objects center-stage. It also points to the convergence of a wide array of experts, the food industry, and humanitarian endeavors, which invokes politics in challenging, if constrained, ways. Here, I aim to show how the technocratic nature of humanitarianism illuminates the tensions between efficient, expeditious and large-scale responses and more politically-mindful and socio-culturally sensitive solutions.

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4.2 The Knowledge and Nutritional Structure of the 1990s

4.2.1 A Global Web of Nutrition Knowledge

The contemporary networks of nutrition knowledge are constituted in multiple sites and arenas. I focus my analysis on the important role of international organizations in this sphere, given their influence both in constituting and implementing knowledge, and their ability to exert significant authority in the nutritional realm. Barnett and Finnemore have shown that international organizations, as autonomous agents with rational-legal authority and bureaucratic control over technical expertise and information, foster the creation of actors, grant them legitimacy, differentiate and delimit their tasks, and attribute normative and social meaning to their work.[6] As bearers of expertise, international organizations influence the fields of knowledge they act upon.[7] Through their expertise and technocratic and rational authority, they further influence the practical developments in their realms of action and the very foundation of global politics.[8]

Nutritional knowledge and international plans of action were increasingly shaped by a geographically-varied cast of characters amid a diverse composition of international organizations. In 1999, the WHO published a manual on the management of severe malnutrition for health professionals. It acknowledged the contributions of key experts in the formulation of the manual, both Western physicians such as Michael Golden and John Waterlow and a number of scientists from developing countries, such as the Peruvian López de Romaña, and Bangladeshi pediatrician Sultana Khanum. Among this expertise panel, the predominance of medical backgrounds sheds light on how medical knowledge

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[6] Michael N. Barnett and Martha Finnemore, "The Politics, Power, and Pathologies of International Organizations," *International Organization* 53, no. 4 (1999): 699-700; 707-708.
[7] Ibid, 709-710.
[8] Ibid, 710, 726.

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continued to be a part of the nutrition field.[9] In 2002, the WHO released a report of the Training Course on the Management of Severe Malnutrition that sought to practically implement the 1999 manual. In this publication, the WHO also granted due mention to an even more diverse group of experts. The role of Western experts remained a mainstay, while experts from India, Myanmar, and Bangladesh also contributed as course facilitators. The WHO further highlighted the presence of course participants from Indonesia, Nepal, Bhutan, Myanmar, and Bangladesh.[10] In 2013, the WHO's updated Guideline on the Management of Severe Acute Malnutrition in Infants and Children, also attested to the plural composition of technical expertise. It acknowledged the participation of experts from Europe, Latin America, Africa and South East Asia, with specializations in fields ranging from medicine, nutrition, epidemiology, public health, and biostatistics.[11] In 2017, the UN Committee on World Food Security launched a report on Nutrition and Food Systems by the High Level Panel of Experts on Food Security and Nutrition. As of September 2017, the Committee was composed by experts from all corners of the world: from China to Argentina, the US to Niger, Pakistan to Chile. These experts came from a breadth of areas, including professionals in agriculture, rural development, nutrition and food sciences, biology, economy, ecology, and indigenous sustainable development.[12] Even as this is a wider thematic arena that deals with food

[9] World Health Organization, *Management of Severe Malnutrition*, vi.
[10] World Health Organization, *Training Course on the Management of Severe Malnutrition,* Course Director Guide (Geneva: World Health Organization, 2002), acknowledgements page.
[11] World Health Organization, Guideline: Updates On The Management of Severe Acute Malnutrition in Infants and Children (Geneva: World Health Organization, 2013), v.
[12] High Level Panel of Experts on Food Security and Nutrition, *Nutrition and Food Systems* (Rome: Committee on World Food Security, 2017), 3; Committee on World Food Security, "High Level Panel of Experts on Food Security and Nutrition (HLPE): HLPE Steering Committee Members," Rome, October 16, 2015. Updated April 29, 2016, accessed January 10, 2019, 1-6.

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security and nutrition beyond the WHO's narrower focus on malnutrition guidelines, it is telling that nutrition and biology scientists composed the High Level Panel of Experts.

The presence of these diverse experts in the WHO and the High Level Panel of Experts on Food Security and Nutrition imparted a heterogeneity to the studies of malnutrition that may have enriched discussions with local specificities. However, I argue that such diversity did not result in more context sensitive approaches and understandings. Rather, this composition presented an opportunity for wider socio-culturally conscious and inclusive guidelines and projects. Studies that explore in detail the decision making structures of international organizations could further shed light on whether this diverse make up of international organizations translated into more balanced and inclusive proposals or if an asymmetrical distribution of authority favored specific members or ideas. An article posted in the influential journal *Nutrition* may hint at some knowledge hierarchies. In attempting to put forth guiding elements to instigate research on the formulation of a single definition of malnutrition, the authors selected "acknowledged experts," which they considered to be scientists that had satisfactory professional experience and publishing history and had engaged in the executive of highly renowned nutrition societies, of which they suggested the European Society of Parenteral and Enteral Nutrition, the American Society of Parenteral and Enteral Nutrition, and the British Association for Parental and Enteral Nutrition.[13] Here, we note that when purporting to be influential in staking a debate around the definition of

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http://www.fao.org/fileadmin/user_upload/hlpe/hlpe_documents/StC/HLPE_Steering_Committee_2015-2017_Final_Edit_2016.pdf

[13] Judith Meijers et al., "Defining Malnutrition: Mission or Mission Impossible?" 432-433.

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malnutrition, some experts resorted to well-established Western entities to ground the legitimacy of their study.

These international experts' various backgrounds also pointed to the transdisciplinary character of the field of nutrition and the way that, even as a wider array of experts came to permeate the field, medico-scientific professions remained firmly entrenched in nutrition.[14] In December 2009, a Summit on Increasing Physician Nutrition Experts assembled 53 experts in the US to discuss strategies that could bolster the engagement of physicians in nutrition in the realms of education, research and clinical practice. The Summit also highlighted the value of a multidisciplinary approach to nutrition that encompassed medicine, dietetics, nursing, and pharmacy.[15] Coupled to the accounts of the experts in international organizations, this example furthers the argument that medicine continued and strives to continue to engage in nutrition.

4.2.2 Coexisting Nutritional Models and an Emphasis on Childhood Malnutrition

After the decline of the protein paradigm, the idea of micronutrient malnutrition was increasingly propelled to the center of nutrition in developing countries. Nutrition responses gradually emphasized the supplementation of vitamin A, iron, zinc and iodine. In 1975, the International Nutritional Anemia Consultative Group (INACG) and the International Vitamin A Consultative Group (IVACG) were created. Ten years later, the International Council for the Control of Iodine Deficiency Disorders was established. In

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[14] Here, I use the concept of transdisciplinarity to denote when "disciplines work *through* each other," though I agree with Gordon that this classification still fixates thinking within disciplinary boundaries. Lewis R. Gordon, "Shifting the Geography of Reason in an Age of Disciplinary Decadence," *TRANSMODERNITY: Journal of Peripheral Cultural Production of the Luso-Hispanic World* 1, no. 2 (2011): 99, original emphasis.

[15] Stephen A. McClave et al., "Compilation of Recommendations From Summit on Increasing Physician Nutrition Experts," *Journal of Parenteral and Enteral Nutrition* 34, Suppl. 1 (2010): 123S-124S.

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1990, the UN proclaimed the intent to virtually eliminate vitamin A and iodine deficiency.[16] A further international acknowledgement came in late 1992, when country representatives assembled at the FAO/WHO International Conference on Nutrition deemed iodine, vitamin A, and iron deficiency as global public health problems.[17] In 2000, nutrition experts Gross, Lopez de Romaña and Tomaro cautioned that micronutrient deficiency in developing countries was "at epidemic proportions," and "may represent the most important public health challenge and the most urgent public health need."[18] The recollections of a Peace Corps health volunteer testified to the influence of these international and scientific consensuses on the ground. In 2010, Simms recounted his experience in Niger from 2007 to 2009 claiming that, "I learned that malnutrition is often caused by a lack of variety in one's diet - a vitamin deficiency - not by a lack of food."[19] In evidence here is a nutritional view that reduced the causality of hunger to nutrients and centered on micronutrients rather than on insufficient food intake. In the late twentieth and early twenty-first centuries, then, the tides of nutritional paradigms swayed back to emphasizing micronutrients, a view prominent during the interwar period.

If in the 1990s a micronutrient paradigm rose in scientific and international prominence, wasting and lack of macronutrients continued to be dominant drivers of

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[16] Richard D. Semba, "The Rise And Fall of Protein Malnutrition in Global Health," *Annals of Nutrition & Metabolism* 69, no. 2 (2016): 80.
[17] Ian Darnton-Hill, "The Challenge to Eliminate Micronutrient Malnutrition," *Australian and New Zealand Journal of Public Health* 23, no. 3 (1999): 310.
[18] Rainer Gross, Guillermo Lopez de Romaña, and John Tomaro, "A Life-Cycle Approach to Multi-Micronutrient Supplementation: Rationale and Programme Concept," *Food and Nutrition Bulletin* 21, no. 3 (2000): 270.
[19] J.T. Simms, "Ingenuity, Peanut Butter, and a Little Green Leaf," *World Policy Journal* 27, no. 3 (2010): 75.

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hunger policy and systematic research.[20] In medico-scientific circles, wasting refers to malnourished children with a "low weight in relation to their height," while stunting refers to the malnourished children who have a low height in relation to their age.[21] Wasting is mainly induced by insufficient food intake, especially calories and protein, and stunting indicates in greater degree prolonged micronutrient deficiencies.[22] Therefore, the emphasis of popular and policy circles upon wasting and a lack of macronutrients existed alongside the surge of attention around micronutrients. This reveals the concurrent and plurality of nutritional paradigms informing the conceptualization and responses to hunger. Moreover, some experts were frustrated that inadequate international responses to malnutrition were based on a "confusion between hunger - lack of food quantity - and malnutrition - the lack of nutritional quality of food."[23] Dr. Lokuge and Dr. Tectonidis, two doctors working for MSF, saw this confusion emerging since, "policymakers and politicians don't quite understand this distinction between hunger and malnutrition […] They've got to understand that *malnutrition is a disease of nutrient deficiency that has to be treated in a specific way*."[24] While policymakers could generally regard hunger as the insufficient intake of food, nutritional expertise sought to attribute a particular medico-scientific connotation to hunger that turned to its biochemical particularities. The 1990s were thus a moment when

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[20] Christopher Barrett and Leah Bevis, "The Micronutrient Deficiencies Challenge in African Food Systems," in *The Fight Against Hunger and Malnutrition: The Role of Food, Agriculture, and Targeted Policies*, ed. David E. Sahn (New York: Oxford University Press, 2015), 63-64, 80.

[21] In 2015, nutrition experts were still frustrated with the lack of scientific knowledge that could ascertain the pathophysiological relationship between wasting and stunting.
André Briend, Tanya Khara, and Carmel Dolan, "Wasting and Stunting—Similarities and Differences: Policy and Programmatic Implications," *Food and Nutrition Bulletin* 36, Suppl. 1 (2015): S15-S16.

[22] Barrett and Bevis, "The Micronutrient Deficiencies Challenge in African Food Systems," 62.

[23] Dr. Buddhima Lokuge, "FOOD IS NOT ENOUGH."

[24] Dr. Milton Tectonidis, "FOOD IS NOT ENOUGH," my emphasis.

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the resurgence of an emphasis on vitamins, as was prevalent in the 1930s, produced a renewed nutritional debate on what the essential problem of malnutrition consisted of and the convergence and coexistence of both micronutrient and protein-energy paradigms. Whether it was a lack of food or nutrient-specific deficiencies that defined hunger, coexisting nutritional models continued to permeate the nutritional arena.

In spite of constant changes in scientific knowledge in the twentieth century and various management protocols for malnutrition that sought to better address it, malnutrition continued to be pervasive in the developing world and was an increasing source of concern in the 1990s. In 1993, a study pioneeringly assembled estimates on the global prevalence and absolute numbers of stunted and wasted children under 5 years old in developing countries. Reaching the alarming estimates of 35.8% underweight, 42.7% stunted, and 9.2% wasted children under 5 years old in developing countries, the study called attention to the large concentration of malnourished children in Asia and Africa, while also highlighting that high indexes of stunting indicated a state of chronic malnutrition.[25] Another 1993 study verified for the first time the "epidemiologic synergism between malnutrition and morbidity," confirming that low weight for age indexes raised mortality rates. The study also importantly remarked on the link between mild and moderate malnutrition and a high risk of mortality.[26] In 1996, an article in the *Bulletin of the World Health Organization* also denounced the high mortality rates for children with severe malnutrition. Schofield and Ashworth, in conducting a worldwide

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[25] M. de Onís et al., "The Worldwide Magnitude of Protein-Energy Malnutrition: An Overview From the WHO Global Database on Child Growth," *Bulletin of the World Health Organization* 71, no. 6 (1993): 709-711.

[26] David L. Pelletier, Edward A. Frongillo Jr, and Jean-Pierre Habicht, "Epidemiologic Evidence for a Potentiating Effect of Malnutrition on Child Mortality," *American Journal of Public Health* 83, no. 8 (1993): 1130, 1132.

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study, observed that child fatality rates from severe malnutrition in the 1990s were higher than in the 1950s.[27] This was alarming given that scientific knowledge in the 1950s was presumed to be embryonic in comparison to the latest developments starting in the late 1970s, when the identification of type I (metabolic) and type II (growth) specific essential nutrients seemed to promise full recovery from malnutrition.[28] Even with decades of detailed scientific investigations and interventions on hunger, studies in the 1990s brought a distressing picture of the problem to the fore. This was also a context where hunger predominantly assumed a different nature: endemic malnutrition. If from the late twentieth century onwards there was a decline in the vastness and intensity of famines, endemic malnutrition and its entailing mortality has been on the rise.[29]

Mounted with this scenario were experts' realization of inconsistencies in the management of hunger that deviated from scientific guidelines. Schofield and Ashworth pointed out that while the current nutritional paradigm established a "restricted protein and energy intake" and the necessary nutrients for metabolic health, an assessment of treatment centers revealed "outmoded and faulty practices," such as the inadequate administration of protein, energy and dietary supplements, improper rehydration solutions and a lack of antibiotic applications.[30] Further problematic, despite nutritional science's findings in the 1960s of the vital contributions of potassium and magnesium for

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[27] Schofield and Ashworth, "Why Have Mortality Rates for Severe Malnutrition Remained So High?" *Bulletin of the World Health Organization* 74, no. 2 (1996): 224.
[28] Michael Golden, "Evolution of Nutritional Management of Acute Malnutrition," *Indian Pediatrics* 47, no. 8 (2010): 669-671; Michael Golden, "Specific Deficiencies Versus Growth Failure: Type I and Type II Nutrients," *Journal of Nutritional & Environmental Medicine* 6, no. 3 (1996).
[29] Cormac Ó Gráda, "Famine is Not the Problem: A Historical Perspective," *Historical Research* 88, no. 239 (2015): 32; Cormac Ó Gráda, "Making Famine History," *Journal of Economic Literature* 45, no. 1 (2007): 5-6, 32.
[30] Schofield and Ashworth, "Why Have Mortality Rates for Severe Malnutrition Remained So High?" 224-225.

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restoring balance in the malnourished, the recommended "high energy milk" diets of "dried skimmed milk, sugar, oil, potassium and magnesium" were largely not incorporated in relief efforts as late as the 1990s.[31] A study published in 1987 collected samples of relief food distributed during the Ethiopian famine of 1985. The research presented data on the insufficient levels of potassium and magnesium in 60% of the relief food, in comparison with the minimum requirements of potassium and magnesium accepted in scientific standards.[32] The British physician and nutrition expert Michael Golden saw the nutritional knowledge and practice discrepancy as evidence that "[…] it can take 50 years for scientific work to leave the shelf of the library and affect programs, particularly when the current concepts and teaching of the etiology and pathogenesis of malnutrition are at variance with the proposed intervention[s]."[33] Therefore, the 1990s were a moment of inflection where confidence and advancements in medico-scientific knowledge simultaneously occurred with the scientific realization of the persistent and unacceptably high prevalence and mortality rates of childhood malnutrition. The special international concern for childhood malnutrition encountered a fertile ground for renewed interest in the research of methods for managing malnutrition, with a specific focus to reversing child fatalities.

4.3 The Emergence of Ready-to-Use Therapeutic Foods

In the early 1990s, the British physician and nutrition expert Michael Golden and his circle of nutritionists devised therapeutic milks with a precise formula diet to address

[31] Michael Golden, "Evolution of Nutritional Management of Acute Malnutrition," 670.
[32] Kim Michaelsen and Torben Clausen, "Inadequate Supplies of Potassium and Magnesium in Relief Food – Implications and Countermeasures," *The Lancet* 329, no. 8547 (1987): 1421.
[33] Michael Golden, "Evolution of Nutritional Management of Acute Malnutrition," 670.

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the needs of severely malnourished children.[34] Following positive field results, the World Health Organization (WHO) endorsed its use in 1999. The WHO formalized that the F-75 formula was designed for the "initial phase of treatment" and the F-100 formula for the "rehabilitation phase," differing only in the specific amounts of constituents appropriate for each stage of treatment. Consisting of a mixture of "dried skimmed milk, sugar, cereal flour, oil, mineral mix and vitamin mix," the formulas could be easily replicable in different contexts, only needing to follow the exact quantities established of each ingredient, to then be mixed with water. The formulas were also commercialized in powder form, which expedited humanitarian deployment. Therapeutic milks needed to be administered in a hospitalized setting that could ensure a clean source of water and medical staff to oversee sterile preparations and correct dosages.[35]

In concomitance with these tests, humanitarian deployment and WHO's endorsement of therapeutic milk formulas, another scientific development was emerging. In 1997, André Briend briefly reported in *Field Exchange* the ongoing trials to modify the F-100 formula and its physical form to create a "ready to eat paste" that would not require diluting the mixture with water, thus eliminating the concerns with contamination. Briend hoped that the new therapeutic food would expand the treatment of childhood malnutrition beyond the confines of therapeutic feeding centers and the need for specialized professionals and infrastructure to administer the F-100.[36] As Scott-Smith recounts, crucial to the development of RUTFs was not only Briend's nutritional

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[34] Michael Golden and André Briend, "Treatment of Malnutrition in Refugee Camps," *The Lancet* 342 (1993): 360.
[35] World Health Organization, *Management of Severe Malnutrition: A Manual for Physicians and Other Senior Health Workers* (Geneva: World Health Organization, 1999), quote on 13, also 14-16.
[36] André Briend, "Treatment of Severe Malnutrition with a Therapeutic Spread," *Field Exchange* 2 (August 1997): 14.

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expertise, but also the technical mastery of Michel Lescanne, founder of Nutriset. Nutriset's experience was fundamental to actualizing Briend's nutritional endeavors into a stable, functional and packageable mixture.[37] Nutriset is a French company guided by a humanitarian mission to ensure "nutritional autonomy for all," through the production of "innovative and effective nutritional solutions."[38] Nutritional autonomy, here, has a delimited technological and solvable meaning. Although I will not explore the struggles surrounding Nutriset's patent of the successfully produced Plumpy'Nut®, it is important to note the partnerships that gave rise to the first and predominant RUTF, as well as point out the tensions involving the protection of a relatively simple formula and production process, alongside the company's self-proclaimed humanitarian pretenses.[39]

A disclaimer at the end of Briend's first RUTF study hinted at the competing interests arising from the manufacture and humanitarian use of RUTFs: "André Briend received a personal consultancy from the Nutriset company which produces this food commercially. The study was partly funded by Nutriset, and partly by Action Contre la Faim."[40] Many of the inaugural studies on RUTFs contained notes on personal affiliations.[41] These highlighted how prominent figures on the frontlines of innovative strategies for managing malnutrition often had professional ties to international agencies

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[37] Scott-Smith, "Sticky Technologies," 14.
[38] Nutriset, "Mandate and Governance," accessed May 1, 2018, https://www.nutriset.fr/en/mandate-and-governance.
[39] Peter Redfield has undertaken a more substantial discussion of the tensions surrounding the Nutriset patent and the humanitarian use of Plumpy'Nut®. Peter Redfield, "Bioexpectations: Life Technologies as Humanitarian Goods," 166-170. Regarding this discussion of Plumpy'Nut's® ownership, see also Scott-Smith, "Sticky Technologies," 13-16.
[40] Briend et al., "Ready-To-Use Therapeutic Food for Treatment of Marasmus," 1768.
[41] Briend, "Highly Nutrient-Dense Spreads;" Steve Collins, "Changing the Way We Address Severe Malnutrition During Famine," *The Lancet*, 358, no. 9280 (2001): 498-501; André Briend, "Possible Use of Spreads as a FOODlet for Improving the Diets of Infants and Young Children," *Food and Nutrition Bulletin* 23, no. 2 (2002): 239-243; André Briend et al., "Putting the Management of Severe Malnutrition Back on the International Health Agenda," *Food and Nutrition Bulletin* 27, no. 3 (2006): S3-S6.

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or were themselves founders of international organizations. This was the case of Steve Collins, who established Valid International, a social organization aiming to reform humanitarian practice through expert technical support and the diffusion of new techniques for effective solutions for malnutrition.[42] André Briend, besides regular consultancies for Nutriset, has also been affiliated with the Department of Child and Adolescent Health and Development of the World Health Organization.[43] These connections demonstrate how influential this small circle of researchers could be, not only to their nutritional scientific community, but also to policy-making in international organizations. These nutritionists both lent authority and received recognition, carving their spaces in the international arena and ensuring the application of nutritional science in responding to malnutrition. This aspect of nutritional experts' interaction with state and international institutions is no novelty. Nutritional science's centrality as a "tool of statecraft" gradually solidified through the interwar and post-World War II scientific debates.[44] The current crystallized authority of nutritional scientists, seen in this perspective, attests to the fluidity and increasing predominance of their influence. Finally, we should not neglect that the pioneer researchers of RUTFs – and nutritional solutions for malnutrition in general – such as André Briend, Michael Golden and Steve Collins, all, primarily, have medical degrees. Through their acceptance amid international organizations and exertion of significant influence over international directives on

[42] Valid International, "About Us," accessed April 12, 2018, http://www.validinternational.org/about-us/.
[43] André Briend et al, "Putting the Management of Severe Malnutrition Back on the International Health Agenda," S3.
[44] James Vernon, *Hunger: A Modern History* (Cambridge: Belknap Press of Harvard University Press, 2007), 87, 117.

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managing malnutrition, medical professionals extend a medicalized view of hunger to the realm of national and global governance.[45]

4.4 The Medicalization of Hunger Lingers On

4.4.1 An Overarching Medical Frame for Viewing Hunger

The high esteem of medical professionals in nutrition circles contributed to the contemporary persistence of a medical frame in viewing and responding to hunger among the international and scientific community. The 1999 WHO manual on the management of severe malnutrition presented malnutrition as a "medical disorder."[46] Listing clinical indicators and laboratory tests that could aid in identifying specific physiological disturbances, and assembling an appendix detailing the physiological impairments of the malnourished and the suggested treatment, the WHO manual signaled a continuance of the medical scrutiny into hunger.[47] However, both the scientific community and international organizations did not solely view hunger through a medical lens, but employed approaches that considered its broader socio-economic causes and

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[45] To mention an example of their model's adoption, the Ethiopian Ministry of Health's 2007 Protocol for the Management of Severe Acute Malnutrition registered in its acknowledgements gratitude for Golden's compilation and editing of the document and UNICEF's technical and financial support. Ethiopian Federal Ministry of Health, "Protocol for the Management of Severe Malnutrition," Addis Ababa, March 2007, 1. Other examples of national and international directives greatly oriented by a small influential circle of nutritional scientists include: World Health Organization, *Management of Severe Malnutrition*; Ministry of Public Health and Population, "Guidelines for the Management of the Severely Malnourished in Yemen," 1 edition, Sa'ana: Republic of Yemen, October 2008; Action Contre la Faim International, "Guidelines for the Integrated Management of Severe Acute Malnutrition: In- And Out-Patient Treatment," Nutrition and Health Department, First Edition, 2011.

[46] World Health Organization, *Management of Severe Malnutrition*, 1.

[47] Ibid, 5-6, 50-52.
Other examples of this scientific interest into the medical mechanisms of hunger can be found in: Ann Ashworth and Claire Schofield, "Latest Developments in the Treatment of Severe Malnutrition in Children," *Nutrition* 14, no. 2 (1998): 244; Ann Ashworth, "Efficacy and Effectiveness of Community-Based Treatment of Severe Malnutrition," *Food and Nutrition Bulletin* 27, Suppl. 3 (2006): S24; Judith Meijers et al., "Defining Malnutrition: Mission or Mission Impossible?" *Nutrition* 26, no. 4 (2010): 435, 437; J.C. Waterlow, "Childhood Malnutrition in Developing Nations: Looking Back and Looking Forward," *Annual Review of Nutrition* 14, no. 1 (1994): 16-17; Briend, Khara, and Dolan, "Wasting and Stunting—Similarities and Differences," S15-S23.

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ramifications. The 1999 WHO manual recognized the social roots of hunger and the need to "correct" both medical and social problems, at the same time that it delineated a clear medical regimen for the initial treatment and rehabilitation phase of the management of malnutrition.[48] Even though Waterlow, the prominent British physician who dedicated much research to childhood malnutrition, acknowledged the deeper political, economic and social roots of hunger, he still advocated for the value of scientific contributions.[49] The centrality of science and technical expertise was secured and would often predominate over social frameworks, even when the multi-factorial nature of hunger was recognized. Therefore, we note the continuance of coexisting frameworks in viewing hunger, even as the medical view had a paramount influence in informing the immediate responses to hunger.

If a medical scrutiny still lingered, scientific articles also emphasized statistical analyses, computerized models, documentation of weight gain, anthropometric science, and the precise measurements and biochemical properties of nutritional compositions.[50]

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[48] World Health Organization, *Management of Severe Malnutrition*, 1-2.

[49] It is particularly interesting that Waterlow conciliated the need for scientific expertise with an acknowledgement of the broader causes of hunger, "One view holds that because the basic causes of this disorder are poverty and deprivation, steps must be taken in the social, economic, and political spheres; further research is unnecessary when the problem is the result of worldwide economic maladjustment and depression. It seems to me that the role of technicians such as myself is to indicate the size of the problem and the most fruitful aspects to which our limited resources should be directed. […] We cannot risk the wastage of human capital that results from the failure to apply scientific knowledge." Waterlow, "Childhood Malnutrition in Developing Nations," 16-17.

[50] Some examples of these elements can be found in: André Briend et al., "Ready-To-Use Therapeutic Food for Treatment of Marasmus"; El Hadji Issakha Diop et al., "Comparison of the Efficacy of a Solid Ready-To-Use Food and a Liquid, Milk-Based Diet for the Rehabilitation of Severely Malnourished Children: A Randomized Trial," *The American Journal of Clinical Nutrition* 78, no. 2 (2003); Ashworth, "Efficacy and Effectiveness of Community-Based Treatment of Severe Malnutrition"; Fabienne Nackers et al., "Effectiveness of Ready-To-Use Therapeutic Food Compared to a Corn/Soy-Blend-Based Pre-Mix for the Treatment of Childhood Moderate Acute Malnutrition in Niger," *Journal of Tropical Pediatrics* 56, no. 6 (2010); Jef Leroy et al., "Using Height-for-Age Difference Instead of Height-for-Age Z-Scores for the Meaningful Measurement of Catch-Up Growth in Children under 5 Years of Age," in *The Fight Against Hunger and Malnutrition: The Role of Food, Agriculture, and Targeted Policies*, ed. David E. Sahn (New York: Oxford University Press, 2015).

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This emphasis on statistical quantifications and anthropometric measurements pointed to the increasing solidity of global anthropometric standards and a growing reliance on mathematical models in nutrition. Though the rise of statistics traces back to the nineteenth century, nutritional anthropometric screening in humanitarian emergencies solidified in the late 1960s.[51] Even as anthropometry became the conventional method for detecting malnutrition, it was only from the mid-1990s that international organizations had access to regular anthropometric data in almost all countries.[52] From the 1980s, UNICEF's yearly publication *State of the World's Children* became a cornerstone in assembling a number of statistics on child health and nutrition. This indicates the increasing use and importance of statistical analyses in child nutrition studies.[53]

From the 1960s, small but significant advancements in computer-based mathematical modeling in biology began to carve a space for its use in fields such as nutrition and clinical science.[54] In the 1970s, some experts, such as the mechanical and economic engineer Joseph Balintfy, advocated for an expansion of the application of mathematical modeling on diet planning and human nutrition, considered to be "still in a developmental stage." Within this view, a range of mathematical sciences, such as "statistics, psychometrics, operations research, and computer science" needed to be more extensively integrated into nutritional science.[55] A group of researchers expert in

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[51] Tom Scott-Smith, "Defining Hunger, Redefining Food: Humanitarianism in the Twentieth Century" (PhD diss., University of Oxford, 2014), 293, 300, 332.
[52] Anna Herforth, "Access to Adequate Nutritious Food: New Indicators to Track Progress and Inform Action," in *The Fight Against Hunger and Malnutrition: The Role of Food, Agriculture, and Targeted Policies*, ed. David E. Sahn (New York: Oxford University Press, 2015), 140.
[53] Ibid, 140-141.
[54] Ray Boston et al., "Cornerstones to Shape Modeling for the 21st Century: Introducing the AKA-Glucose Project," in *Mathematical Modeling in Nutrition and the Health Sciences*, eds. Janet Novotny, Michael Green, and Ray Boston (New York: Springer Science and Business Media, 2003), 22.
[55] Joseph Balintfy, "Mathematical Modeling and Human Nutrition," *Science* 181, no. 4099 (1973): 581.

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biostatistics claimed that, starting in the 1990s, "revolutionary developments in life science technologies" granted an even more prominent role for statistical analysis. This was due to the development of more efficient and computerized methodologies and bioinformatics databases that promised more specific and optimized nutrition studies.[56] Anthropometric and statistical science both have been an important component in hunger studies since as early as the interwar, if not before.[57] It would be fruitful to investigate how the involvement of mathematical sciences and data informatics came to be so integral to nutrition research. Tracing a longer history of the development of these fields and how they came to pervade hunger studies can yield historically-grounded insight into the role of different types of expertise in making hunger knowledge more objective, quantifiable and standardized.

A medical frame is not only evident in the continuous medical scrutiny into hunger, but also in the way hunger was conceptualized and managed in situations of nutritional crisis. MSF viewed the 2005 Niger famine through a predominant medical frame, which, in turn, shaped a prevalent narrative around the food crisis. Jézéquel, a MSF political consultant, recounted the multiple and divergent points of view among different organizations and local actors regarding the severity of the crisis and which kind

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[56] Wenjiang Fu et al., "Statistics and Bioinformatics in Nutritional Sciences: Analysis of Complex Data in the Era of Systems Biology," *The Journal of Nutritional Biochemistry* 21, no. 7 (2010): 561-562.
[57] From dietary standards of the League of Nations to emerging scientific methods, such as the elaboration of the Pelidisi system to select the malnourished for admission to relief, the interwar began to see coordinated efforts to quantify and measure hunger in an international scale. To *calculate* hunger, then, a range of scientific areas were brought to bear in assessments and research. Vernon, *Hunger*, 126-130; C. Sathyamala. "Of Norms and Standards of Nutritional Status: A Critique," in Contested Evolution of Nutrition for Humanitarian and Development Ends: Report of an International Workshop, eds. Susanne Jaspars, Tom Scott-Smith, and Elizabeth Hull (University of Oxford, October 2018), 6.

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of responses it required.[58] MSF's narrative aligned with the organization's strategy of testing and internationally propelling a new approach to childhood malnutrition through the use of RUTFs.[59] MSF's particular reading of the Niger crisis as a medical problem shaped a prevailing medicalized view of the nutritional problem and its suitable solutions, termed by some as "a 'medical coup' that temporarily superseded local sovereignty over food and nutrition security."[60] Through medical lenses, MSF legitimately implemented an elaborate, if simplistic, nutritional program in the Maradi, Tahoua and Zinder regions of Niger. This consisted of selection procedures based on anthropometric measurements to identify malnourished children to be admitted to the outpatient scheme of RUTF prescriptions and monitoring through weekly consultations or hospitalization. All children in the program were submitted to a standard regimen of medicines and specific concurrent diseases were treated with the adequate pharmaceuticals. The program stipulated improvement standards and an "exit criteria," and evaluated results based on "cure rates, default rates, and mortality rates," the amount of weight gain, readmission rates, duration of care, and place of care (whether hospitalized or home-based).[61] MSF's nutritional scheme resulted in the organization's historic and successful feat of "treating" over 60,000 severely malnourished children.[62]

The use of a medical frame facilitates a characterization of the efficacy of RUTFs as unprecedented and its portrayal as a novel solution. The encouraging results of MSF's

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[58] Jean-Hervé Jézéquel, "Staging a "Medical Coup"? Médecins Sans Frontières and the 2005 Food Crisis in Niger," in *Medical Humanitarianism: Ethnographies of Practice*, eds. Sharon Abramowitz and Catherine Panter-Brick (Philadelphia: University of Pennsylvania Press, 2015), 125-128.
[59] Ibid, 122, 125-126
[60] Ibid, 128.
[61] Defourny et al., "Scaling Up the Treatment of Acute Childhood Malnutrition in Niger," 2.
[62] Milton Tectonidis, "Crisis in Niger - Outpatient Care for Severe Acute Malnutrition," *New England Journal of Medicine* 354, no. 3 (2006): 225.

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malnutrition operation in Niger impelled the organization to launch an advocacy campaign for an "increased and expanded use of new and revolutionary ready-to-use therapeutic foods, ideal for treating childhood malnutrition."[63] Scott-Smith has insightfully argued that Plumpy'Nut® has been fetishized by humanitarian workers and news reports as a miraculous and revered solution, heralded as the best possible treatment to hunger.[64] RUTFs should be inserted in a historical trajectory of multiple attempts – failed, discontinued or displaced – at formulating solutions to malnutrition. They should also be conceived along a specific socio-cultural understanding of food, instead of a calculated composition of nutrients that easily mutated into medicine.[65]

Framing RUTFs as a never before seen solution effaces a historical lineage of the various attempts to manage malnutrition. In 1943, still amid the Second World War and following its impetus of nutritional experimentation, we have seen how responses to the Bengal famine employed protein hydrolysates. Nutritional strategies in the mid-twentieth century embodied a capacity to resuscitate the nearly dead, much like the vision displayed by Dr. Tectonidis in 2007: "MSF treated 60,000 children that year in Niger—severely malnourished children—that is, *children that were almost half dead at presentation* and we rehabilitated them."[66] Though seemingly miraculous, the Bengal experience was not without collateral losses, and the subsequent application of protein hydrolysates in liberated Belsen showed gross limitations in efficacy and acceptance.[67] The F-100 and F-75 therapeutic milks, seen as the most direct antecedents to RUTFs, can

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[63] Doctors Without Borders/Médecins Sans Frontières (MSF), "FOOD IS NOT ENOUGH."
[64] Scott-Smith, "The Fetishism of Humanitarian Objects and the Management of Malnutrition in Emergencies," 917-918.
[65] Scott-Smith, "The Fetishism of Humanitarian Objects and the Management of Malnutrition in Emergencies," 921-922, 924-925.
[66] Dr. Milton Tectonidis, "FOOD IS NOT ENOUGH," my emphasis; Vernon, *Hunger,* 148-149, 151.
[67] Vernon, *Hunger*, 148, 152.

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be traced to Cicely William's responsive use of "Nestlé's sweetened condensed milk with cod-liver oil and malt" to treat kwashiorkor in the 1930s.[68] This saw the subsequent proliferation of fortified milks, especially for malnourished children for whom liquid treatments were scientifically deemed more suitable, until it consolidated into the well-known formulas of the F-75 and F-100.[69] Further situating RUTFs in a broader historical continuum of attempts to elaborate magical nutritional solutions, especially the 1960s surge in high-protein creations, RUTFs do not seem far off from the Indian Central Food Technological Research Institute's multipurposed foods.

The overarching medical frame that informed scientific studies and humanitarian projects continued to view hunger through a limited prism that emphasized the need to immediately enact physiological and nutritional fixes. MSF's nutritional program in Niger illustrates how a medical framework oriented the type of nutritional program implemented to manage hunger, one that prized efficacy and favored technically-engineered solutions which could be effectively distributed in large-scale. A medical lens further propels the portrayal of RUTFs as novel and miraculous, aggrandizing scientific expertise instead of locally-sensitive initiatives. MSF's nutritional program design also points to another feature we will explore next: the view of food as medicine and the envelopment of hunger relief within a framework of medical treatment.

4.4.2 Plumpy'Nut® as Medicine, Managing Hunger as Treatment

With therapeutic protocols to treat hunger administering medicine alongside nutritional interventions, we note a continuance of integrating the management of hunger

[68] Cicely Williams, "Kwashiorkor: A Nutritional Disease of Children Associated with a Maize Diet," *The Lancet* 226, no. 5855 (1935): 1151.
[69] Scott-Smith, "The Fetishism of Humanitarian Objects and the Management of Malnutrition in Emergencies," 922.

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with the care of other diseases, leading to malnutrition regimens that blended food and pharmaceutical compounds.[70] In 1995, the WHO released technical guidelines and a training course for a new approach to the management of sick children. The WHO argued for the "integrated management of the sick child," especially since five conditions accounted, annually, for 70% of deaths of children under 5 years old and for 75% of infirm children in need of health care in developing countries.[71] Given the high prevalence of diarrhea, measles, pneumonia, malaria and malnutrition and their frequent combined occurrence, the WHO devised integrated assessment tools and treatment protocols.[72] With this initiative, malnutrition continued to be placed alongside other diseases, considered as a disease in itself, and integrated in medical protocols of disease management. In the late 1990s, the nutrition experts Ann Ashworth and Claire Schofield voiced concern over the lack of integrated care with malnutrition cases. Viewing the separated treatment of different conditions as "fatal," they advocated for an approach that considered the management of all coexisting illnesses, such as diarrhea and infections, alongside malnutrition. This would enable carefully designed and precise therapeutic prescriptions.[73] The update on the WHO technical guidelines published in 2005 and the 2013 report on the implementation of the integrated management of childhood illness in

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[70] This point can be found in a number of works referenced along this chapter: World Health Organization, *Management of Severe Malnutrition*, 55-56; Diop et al., "Comparison of the Efficacy of a Solid Ready-To-Use Food," 303; Ashworth, "Efficacy and Effectiveness of Community-Based Treatment of Severe Malnutrition," S28, S30, S38; Nackers et al., "Effectiveness of Ready-To-Use Therapeutic Food," 408.
[71] World Health Organization, "Integrated Management of the Sick Child," *Bulletin of the World Health Organization* 73, no. 6 (1995): 735.
[72] Ibid, 735-737.
[73] Ashworth and Schofield, "Latest Developments in the Treatment of Severe Malnutrition in Children," 244.

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the Western Pacific demonstrate the continuity of this approach in international health.[74] In MSF's nutritional strategy in Niger, not only was the administration of RUTFs medicalizing hunger in defining the pathological boundaries of malnourishment and "dosages" of Plumpy'Nut®, but inserting RUTFs within a therapeutic regime of medications and food aid further blurred the lines of nutrition and medicine and enveloped the treatment of hunger within both medical and food distribution domains.[75]

A circumscribed vision of malnutrition as disease facilitated the portrayal of RUTFs as medicine, and maintained the management of hunger within a logic of treatment, instead of relief. RUTFs were depicted as embodying quasi-magical properties, allowing for mass and effective treatment: "MSF *treated* 60,000 children that year in Niger […] with an over 90 percent *cure rate*."[76] In this view, hunger continued to be regarded as a disease, in need of a specific treatment that could "cure" the afflicted.[77] Scott-Smith has pointed out how Plumpy'Nut® mutates into a medicine in humanitarian emergencies.[78] The fact humanitarian providers harbored and expressed this view influenced this dissemination on the ground. The Peace Corps Health volunteer J.T. Simms, while working in a rural region of Niger from 2007 to 2009, recalled that Plumpy'Nut®, distributed in humanitarian-run clinics, induced villagers to regard it as a

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[74] World Health Organization, Technical Updates of the Guidelines on the Integrated Management of Childhood Illness (IMCI): Evidence and Recommendations for Further Adaptations (Geneva: WHO Document Production Services, 2005); World Health Organization, "Integrated Management of Childhood Illness (IMCI) Implementation in the Western Pacific Region: Information Package," Manila: WHO Regional Office for the Western Pacific, 2013, accessed January 19, 2019, http://iris.wpro.who.int/handle/10665.1/5364.
[75] Defourny et al., "Scaling Up the Treatment of Acute Childhood Malnutrition in Niger," 2.
[76] Dr. Milton Tectonidis, "FOOD IS NOT ENOUGH," my emphasis.
[77] One of MSF's conclusion from its experience in Niger illustrates well the organization's regard of Plumpy'Nut® as medicine: "All *reason and evidence* suggests that faced with an effective, accessible and easy to use *remedy*, parents are willing to go to great lengths to save the lives of their children." Defourny et al., "Scaling Up the Treatment of Acute Childhood Malnutrition in Niger," 2, my emphasis.
[78] Scott-Smith, "The Fetishism of Humanitarian Objects and the Management of Malnutrition in Emergencies," 924.

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medicine.[79] In contemporary protocols of malnutrition management, thus, Plumpy'Nut® materialized the transformation of food into medicine and experts' understanding of hunger relief as treatment persisted. The commercial marketing of Plumpy'Nut® both draws upon and reinforces this medicalized view of hunger. The pioneer producer and owner of the patent, Nutriset, displays in its website the recommended dosage and product specifications of Plumpy'Nut®. The simplicity of the medical protocol and the indication that hunger demands treatment effectively suit urgent humanitarian needs and position Plumpy'Nut® as appropriate to the medical paradigm.[80]

Extracted from the Nutriset Website: Nutriset, "Plumpy'Nut®." Accessed February 2, 2019. **Plumpy'Nut® 1**

Viewing RUTFs as medicine could even be extrapolated beyond the emergency realm by some experts. Dr. Tectonidis enunciated that "I believe that these therapeutic foods should be considered *essential medicines* and should be *integrated into regular health care services, rather than simply made available during emergencies*."[81] Transposing a technocratic, medicalized and emergency response toward malnutrition to consolidated domestic policies, besides generating a local reliance on industrialized and

[79] Simms, "Ingenuity, Peanut Butter, and a Little Green Leaf," 76.
[80] Nutriset, "Plumpy'Nut®," accessed February 2, 2019, https://www.nutriset.fr/products/en/plumpy-nut.
[81] Tectonidis, "Crisis in Niger - Outpatient Care for Severe Acute Malnutrition," 226, my emphasis.

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imported products, eclipses the politico-economic causes of malnutrition. Even if there have been efforts to transplant the manufacturing process to recipient countries, the majority of RUTF deployments were still dependent on developed countries' supply.[82] The doctor and humanitarian actor Steve Collins has charted that the community-based management of hunger started grounded in a decentralized model of local production of RUTFs with locally-sourced ingredients, but the UN scaling up of demand displaced these local initiatives. Increasingly, the UN has required that RUTF production meet high pharmaceutical standards and certified manufacturing practices, which favors large quality-assured outputs in disconnection with local networks of labor and locally-integrated approaches. In this way, a more medical and technical model superseded local initiatives that, though still inserted in a medical paradigm of hunger, had a greater level of community engagement.[83]

The simplified outpatient feeding program that Plumpy'Nut® enabled did not erase the medical character of managing hunger. Even back in the 1990s, when experts had already been discussing the most cost-effective approach to malnutrition, Ashworth and Schofield advised that "skilled medical care" and well trained domiciliary health workers were crucial in home-based care. They further cautioned that this strategy required nutritionally-specific, culturally-sensitive, and viable recipes as well as "clear guidance" on the content, amount and frequency of feedings.[84] Both in this model's

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[82] UNICEF, "Ready-to-Use Therapeutic Food for Children with Severe Malnutrition," Position Paper no. 1 (June 2013): 1.
[83] Steve Collins, "The Treatment of Severe Acute Malnutrition (SAM): The Origins of CMAM," in Contested Evolution of Nutrition for Humanitarian and Development Ends: Report of an International Workshop, eds. Susanne Jaspars, Tom Scott-Smith, and Elizabeth Hull (University of Oxford, October 2018), 8-9.
[84] Ashworth and Schofield, "Latest Developments in the Treatment of Severe Malnutrition in Children," 245.

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idealization and the practical implementation of feeding programs administering Plumpy'Nut®, therefore, transferring the care to the home place did not remove the medical and nutritional scientific character of the management of malnutrition. The need for weekly check ins at the clinic for health professionals' assessment of nutritional status and prescription of the specific regimen maintained this community-based model squarely inscribed in a "treatment" logic.

4.5 Envisioning the Contours of Contemporary Humanitarian Designs

4.5.1 Ready-to-Use Therapeutic Foods: Targeting Children, Controlling Relief

We have seen how since the post-World War I relief efforts, the child and the child's body occupied a special space in humanitarian aid, and the management of hungry children was distinguished from broader relief efforts.[85] The post-World War II saw a systematic international concern for identifying and treating malnutrition that increasingly centered around children's vulnerable figure. From the period of decolonization in the mid-twentieth century, Western conceptions of humanitarianism centered on the emaciated African child.[86] Since the late twentieth century, development projects in the Third World prioritized attention to child programs.[87] The institutionalized Western model of humanitarianism has focused on the child for it elicits the compassion

[85] Friederike Kind-Kovács, "The Great War, the Child's Body and the American Red Cross," *European Review of History* 23, no. 1-2 (2016): 39, 41.
[86] Eleanor Davey, John Borton, and Matthew Foley, *A History of the Humanitarian System: Western Origins and Foundations*, Humanitarian Policy Group Working Paper (London: Overseas Development Institute, June 2013), 10.
[87] Didier Fassin, *Humanitarian Reason: A Moral History of the Present*, Translated by Rachel Gomme (Berkeley: University of California Press, 2012), 168.

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of donors and can assure the stability of its "supply-driven approach."[88] In contemporary designs of humanitarian nutrition, the child continues to occupy a specific place amid aid practices. Humanitarian feeding programs are structured in a "directed, top-down, and controlling" manner, where adults are the locus of education procedures such as cooking and hygiene demonstrations, and children are subjected to physical examinations and entitled to nutritionally-specific food mixtures.[89] Anthropometric measurements made with a mid-upper arm circumference (MUAC) band ensure that a simple and efficient screening process centered on the child's body determines the nutritional regimen that will follow, whether the distribution of supplementary rations of enriched flour blends or specific foods administered in a therapeutic feeding center.[90]

Differentiating the child from broader relief efforts has been a mainstay of humanitarian action. During the Ethiopia famine in 1985, a study investigated the nutritional adequacy of the relief foods distributed in a number of provinces across the country. The findings pointed to the insufficient amounts of potassium and magnesium in the dry food rations. The experts in pediatric nutrition, Michaelsen and Clausen, found that only in "wet" therapeutic feeding centers was there a significant provision of potassium and magnesium given the supply of dry skimmed milk. The greater dietary requirements of children and known greater vulnerability to starvation, therefore, provided children with a special feeding regimen. Although nutritional science promoted specific models of nutritional health that stressed the importance of these micronutrients,

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[88] Tony Vaux, "Traditional and Non-Traditional Humanitarian Actors in Disaster Response in India," In *The New Humanitarians in International Practice: Emerging Actors and Contested Principles*, eds. Zeynep Sezgin and Dennis Dijkzeul (London: Routledge, 2016), 331-332.
[89] Tom Scott-Smith, "Control and Biopower in Contemporary Humanitarian Aid: The Case of Supplementary Feeding," *Journal of Refugee Studies* 28, no. 1 (2014): 26, 30-34.
[90] Ibid, 32-34.

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this knowledge was not always integrated in wider relief efforts. In the Ethiopian case, logistic and economic problems largely restricted the distribution of relief food to solely cereal and oil. Nonetheless, children's vulnerability inserted their management in special feeding protocols that included the provision of dried skimmed milk.[91] Not only did the child receive a differentiated meal with high contents of potassium and magnesium, but this meal was administered in supplementary, intensive, or therapeutic feeding programs, attributing a particular and augmented medicalized vision of handling child malnutrition.

The feeding program MSF established in Niger further illustrates the child-centered contemporary design of humanitarian nutrition. From the selection protocol based on anthropometric measurements of children to the evaluation of their degree of pathology, MSF's nutritional program provided food rations and a one-month discharge ration to the families, while children received therapeutic care based on Plumpy'Nut® prescriptions.[92] This emphasis on children was marked in the assessment and flash appeal of the United Nation's Office for the Coordination of Humanitarian Affairs (OCHA). While the humanitarian response plan outlined broader activities to target the general population, such as providing food assistance and enabling higher seed and food availability and accessibility, children under five and pregnant and lactating women were singled out to be "recuperated" through a special nutritional plan of therapeutic and supplementary feeding.[93] International statistical estimates of the Nigerian population at risk of malnutrition also emphasized the vulnerability of children: "2.5 million [people]

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[91] Kim Michaelsen and Torben Clausen, "Inadequate Supplies of Potassium and Magnesium in Relief Food – Implications and Countermeasures," *The Lancet* 329, no. 8547 (1987): 1421-1423.
[92] Defourny et al., "Scaling Up the Treatment of Acute Childhood Malnutrition in Niger," 2.
[93] United Nations, "Niger 2005, May–September, Flash Appeal," Office for the Coordination of Humanitarian Affairs (OCHA), 23 May 2005, 1.

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are considered extremely vulnerable, including 800,000 children under five. It is estimated that 150,000 of these children are malnourished (moderate and severe malnutrition)."[94] The international response and MSF's feeding programs were predicated on the singularity of the child and its presumed vulnerability, which attributed a paternalistic and controlling character to relief. As Dr. Tectonidis, MSF's nutritional adviser and one of the key actors in MSF's program in Niger, reasoned in a MSF advocacy attempt to amass support for the use of RUTFs: "[…] this disease [malnutrition] is mostly striking very young children. Because they're dependent. They can't feed themselves. Because they have very special tastes. A kid will not eat anything […] so it needs to have specially prepared foods."[95] I remark that this rationale stemmed from a Western conception of childhood that projects a universal biologically-oriented view of the child disconnected from its socio-cultural and historical milieu.[96] A specific Western conception of childhood, coupled to a humanitarian nutrition emphasis on child relief, favor the implementation of distinct medical and nutritional interventions toward children amid nutrition crisis.

In the case of Plumpy'Nut®, this humanitarian concern for centering on the child's vulnerability and dedicating specific nutritional protocols for the management of childhood malnutrition is evident. RUTFs are especially designed for children's palates, nutritionally balanced to meet children's dietary requirements, and assembled in individual packages to delimit the intended consumer. Plumpy'Nut® contains such a

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[94] Ibid, 5.
[95] Dr. Milton Tectonidis, "FOOD IS NOT ENOUGH."
[96] Allison James, "Understanding Childhood from an Interdisciplinary Perspective: Problems and Potentials," In *Rethinking Childhood*, edited by Peter Pufall and Richard Unsworth (New Brunswick: Rutgers University Press, 2004), 26-28.

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precise quantity and vast variety of micronutrients that nutrition experts deem it to be more suitable than *any* "combination of locally available, micronutrient-rich foods."[97] Besides its proper nutritional composition, Plumpy'Nut® is adequate for children's palates, and ensures safety and durability, especially in settings of poor sanitation and infrastructure.[98] This stability materialized in a more confined product, in which the possibility of molding and sharing food, still somewhat enabled by dry food rations, was even more bounded in the product's individual packets, especially formulated for children's needs, and stiffened final form of Plumpy'Nut®.[99] There is, therefore, a persistent underlying paternalistic frame in humanitarian action that stems from a need for controlled and bounded relief technologies.[100]

4.5.2 The Limits of Humanitarian Politics

MSF employed a perceptive reading of the structural conditions and the authorities' flawed measures leading up to the 2005 Niger famine. MSF's first attack on the inadequate international response to the Niger famine came in the organization's critique of a lack of international monitoring and preparedness, "essentially limited to rainfall data and agricultural production estimates […] combined with a fatalistic complacency towards high 'structural' rates of wasting."[101] Dr. Tectonidis' comments on the famine in Niger further evidenced a sharp perception of the multi-causal factors of the

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[97] Mark J. Manary, "Local Production and Provision of Ready-To-Use Therapeutic Food (RUTF) Spread for the Treatment of Severe Childhood Malnutrition," *Food and Nutrition Bulletin* 27, suppl. 3 (2006): S88.
[98] André Briend, "Possible Use of Spreads as a FOODlet for Improving the Diets of Infants and Young Children," *Food and Nutrition Bulletin* 23, no. 2 (2002): 240-241. These positive and precisely adequate features of RUTFs are also voiced in: Doctors Without Borders/Médecins Sans Frontières (MSF), "FOOD IS NOT ENOUGH."
[99] Scott-Smith, "Sticky Technologies," 11-12.
[100] Ibid, 6-7.
[101] Defourny et al., "Scaling Up the Treatment of Acute Childhood Malnutrition in Niger," 2.

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famine: "the government and its international partners […] saw the food deficit as a circumscribed problem and feared that relief assistance would disturb the market and hamper long-term development goals."[102] This official vision invoked the prevalent Malthusian and neo-Malthusian conceptions of hunger of the late eighteenth until the mid-nineteenth century. Based on a political economy rationale, Malthusian views proposed state inaction in favor of the market's natural correcting forces, which, although subdued by a humanitarian sympathy, continued to be ever present in policymakers' mindset of managing hunger.[103] In spite of this comprehensive view of hunger's causes, there was a simultaneous depoliticization in MSF's resort to a medical definition and intervention in malnutrition through the use of RUTFs.

We can find an additional indication of MSF's complex political stance in a MSF teleconference's opening statement: "Malnutrition kills 5 million children a year."[104] In placing malnutrition as the killer of children, this compelling assertion concealed the role of states, policies and unequal structures in malnutrition, while also not calling for accountability. This may suggest MSF's option for simpler discourses to broaden the message's audience and fundraising potential, which, in turn, indicated the constraints of humanitarianism and the limitations of its political criticism. As Redfield analyzed by examining MSF's ethos, the organization simultaneously "recognizes and refuses politics."[105] Redfield attributed this disjuncture to humanitarianism's inherent nature, driven by urgency and encapsulated by principles of independence and neutrality that

[102] Tectonidis, "Crisis in Niger - Outpatient Care for Severe Acute Malnutrition," 225.
[103] Vernon, *Hunger*, 273.
[104] Doctors Without Borders/Médecins Sans Frontières (MSF), "FOOD IS NOT ENOUGH."
[105] Peter Redfield, "Doctors, Borders, and Life in Crisis," *Cultural Anthropology* 20, no. 3 (2005): 343.

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could not hold a "final responsibility" over suffering.[106] While such a refusal of politics may be central for ensuring the legitimacy and continuance of humanitarian action, they delimited its boundaries of critique. This became further problematic in attempts to envision long-term solutions, such as Dr. Tectonidis' call for integrating RUTFs into national health programs.[107] We need to acknowledge, as de Waal pointedly noted, the centrality of the "failures of political accountability" in famine, which, left unexamined, "entrench power and ideological hegemony."[108]

A politicized and comprehensive view of RUTFs, however, has energetically challenged technocratic nutritional discourses, from scholarly voices to struggles on the ground. One example where the application of RUTFs has encountered local resistance was in India, in the mid-2000s. Right to Food is a broad civil society movement in India that acknowledges the structural causes of malnutrition, seen as a "signifier of social injustice," where RUTFs are potential social and economic destabilizers. Some proponents of the movement head a strong critique of RUTF's universalistic model and ties with the international food industry.[109] The movement shifted to embrace a medicalized view for managing malnutrition, instigated by an unauthorized use of RUTFs by UNICEF in a malnutrition crisis in 2008, which, though considered an illegal intrusion, persuaded some sectors of Right to Food on the treatment's efficacy.[110] While sectors of the movement have been adopting a medical view on responding to

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[106] Ibid.
[107] Dr. Milton Tectonidis, "FOOD IS NOT ENOUGH;" Tectonidis, "Crisis in Niger - Outpatient Care for Severe Acute Malnutrition," 226.
[108] Alexander de Waal, *Famine Crimes: Politics & the Disaster Relief Industry in Africa* (Bloomington: Indiana University Press, 1997), 85.
[109] Stéphane Doyon, "India: The Expert and the Militant," in H*umanitarian Negotiations Revealed: The MSF Experience*, edited by Claire Magone, Michael Neuman and Fabrice Weissman (London: C. Hurst & Co, 2011), 150-151.
[110] Ibid, 156-158.

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malnutrition, they still advocated for national and local control over administering nutritional therapies, under the local scientific endorsement of treatment protocols. There is also an evident desire to retain the prerogative of production based on a "local Indian formula," and integrated with a manufacturing chain of "national food companies and India's food and agriculture cooperatives."[111] Whilst a medicalized view of the management of malnutrition may prove difficult to disavow in contexts where there is an acute need for large projects, it is possible to anchor localized responses that need not be seen as incompatible with a comprehensive (and political) view of hunger.

4.6 Conclusion

This chapter has traced the continuing features in the medicalization of hunger to argue that the medical lens persists in contemporary times as an important explanatory framework for conceptualizing and responding to hunger since the 1990s. Scientific studies have continued to medically scrutinize hunger, which contributed to extending the view of hunger as disease among scientific and humanitarian circles. The WHO guidelines on the Integrated Management of Childhood Illness contributed to solidify the already existing practice of integrating the management of hunger to the care of other diseases, so that the management of hunger blended pharmaceutical compounds and nutritional interventions. The relief model that crystallized in the 1960s, which aggrandized science and aligned with a monoculture-based agriculture that guided donor states' production of processed fortified foods, persisted. Even if independent from states, NGOs still depended on the international food aid system to obtain the products for relief

[111] Ibid, quote on 160, also 159.

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distribution, thus enlarging and carrying on this modernist and state-oriented model.[112] Food aid, however, was only one part of the management of hunger schemes. The scientific community conceptualized severe acute childhood malnutrition as demanding specific therapeutic regimens, which both differentiated the malnourished child and specifically medicalized its management. Plumpy'Nut® illuminated the continued regard for food as medicine and the conceptualization of hunger relief as treatment. Even when the community-based model removed some medical control over the management of hunger, Plumpy'Nut's® packaging, specific nutritional composition, and monitoring of the protocol by health professionals ensured the persisting inscription of hunger in medicalized protocols of management. A medical framework was never mutually exclusive from understandings that acknowledged the deeper causes of hunger, but the medical view was predominant in informing the immediate responses to hunger.

Nutritional science, despite its pretensions to convey scientific certainties, has been more fractured and contested than homogeneous, permeated by plural nutritional models and in a relentless search for further developments in scientific knowledge. The authority of nutritional scientists in shaping national and international policies reinvigorated in the late twentieth century. This has converged with the technocratization of humanitarianism and the presence of many of these experts in humanitarian organizations. I have shown that, from the 1990s until contemporary times, nutrition knowledge continued to be a global and an even more transdisciplinary undertaking. With nutrition forums composed of professionals from multiple corners of the globe in areas that ranged from mathematics to biology to social sciences, the influence of medical

[112] Scott-Smith, "Beyond the 'Raw' and the 'Cooked': A History of Fortified Blended Foods," *Disasters* 39, no. 2 (2015): 256.

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sciences in the field of nutrition endured, while the thematic expertise further broadened. The inclusion of geographically-varied experts in areas from economy to development hints at the attempt of more diverse and representative international forums. It would be enriching to have further research explore the connections between these expert forums, policy-making, and nutrition projects, to gauge in more detail the international body of nutrition knowledge and its effects on the ground.

More than historical disruptions or novelties, relief technologies for managing malnutrition – from protein injections and therapeutic milks to RUTFs – signal a scientific preoccupation with the precise quantification of ingredients and standardized models, as well as a need for products more suited to emergency contexts with logistical and infrastructural limitations. The contextual demands and constraints for humanitarian objects help to understand the impetus to forge partnerships with the industrial food complex and the increasingly commercial nature of relief technologies. A narrow and medicalized view that emphasized novelty, then, helps to elucidate humanitarianism's need to value effective and bureaucratic responses in the face of a mandate centered on immediately and extensively saving lives.[113] It also helps to perceive how this need leads humanitarianism to be "object-centred […] defined by the delivery of objects according to a limited and standardised template."[114] The paradox of a technocratic humanitarianism is, thus, a greater ability to respond to urgencies with high-yielding efficacy at the expense of politically-transformative and more humane solutions.[115] The

[113] Scott-Smith, "The Fetishism of Humanitarian Objects and the Management of Malnutrition in Emergencies," 925.
[114] Ibid, 926.
[115] Ibid, 926-927.

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humanitarian imperative seems ever more bounded to a mandate that translates into limited, bureaucratic and medicalized responses to hunger.

Scientific contention, after over a half century of vigorous medical scrutiny into hunger, still revolves around the question of whether food is enough to manage severely acute malnutrition. The answer need not lose sight of the politico-economic causes of hunger and the socio-cultural meanings that should be incorporated in humanitarian strategies. The effects of a response based on the provision of large supplies of industrialized and mostly imported ready-to-use therapeutic foods cannot be neglected. Right to Food's advocacy shows a possible path in this direction. In rethinking the disjointed dynamics of contemporary humanitarianism, relief technologies open many avenues of interdisciplinary research and instigate debates on the implications of technical solutions that result in a complex acknowledgment and refusal of politics. History can offer us a lens to comprehend, challenge and critique the struggles surrounding humanitarian objects that now resurface in the form of ready-to-use therapeutic foods.

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Chapter 5

Conclusion

In 2017, 150.8 million children under five years old were stunted, 50.5 million were wasted, and 38.3 million were overweight.[1] These numbers appeared in the 2018 edition of the Global Nutrition Report, compiled by an independent expert group consisting of professionals from all corners of the globe, some based in universities and others part of international organizations such as the FAO, UNICEF, WHO, and Concern Worldwide. The report diagnosed the still "unacceptably high" prevalence of malnutrition around the world, while confidently advocating that now is a golden moment for meeting the UN target of eliminating malnutrition in all its forms by 2030. The experts attributed the favorable scenario to "game changing" advances in data collection and analyses, consolidated and unprecedented knowledge on the efficacy of policies, and a robust level of commitment from the international community and national actors to combat malnutrition in all its forms.[2] The confidence and reliance on scientific knowledge and optimized processes continues to find resonance among the international nutrition system.

This thesis has charted the attempts of the nutrition community to conceptualize and respond to hunger for over half a century. In spite of finding prominence among scientific and policy discussions, fostering copious and intricate medico-scientific

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[1] Of these, the higher prevalence of stunting was concentrated in low-income countries, as was the larger prevalence of wasting also centered in lower-middle-income countries.
Development Initiatives, *2018 Global Nutrition Report: Shining a Light to Spur Action on Nutrition* (Bristol: Development Initiatives, 2018), 30, 34.
[2] Ibid, 5, 11, 13.

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studies, instigating the development of nutritional solutions, and stimulating the formulation of detailed treatment regimens, current figures show us that hunger remains pervasive, though concentrated in low-income countries and populations. If science and medicine have a role in managing malnutrition, scientific advances per se will not solve hunger. I have argued that a restrictive emphasis upon a medical frame of hunger is insufficient and short-sighted. When a medical lens takes prominence, we restrict the terms of our conversation, we narrow the outlook, we reduce hunger to bodily measurements and a physiological process when we need to acknowledge the broader structural causes at play. Locating the problem in the body has favored technical and immediate fixes to correct specific physiological disorders. Priming for medical and nutritional results, humanitarian nutrition has privileged technically-engineered solutions and trusted the industry and market to more efficiently and securely provide and manufacture nutritional concoctions. These industrially-produced specialized foods efface the social and cultural meanings of food and have largely been disconnected from local realities, networks, and actors.

Moreover, the medicalization of hunger's focus on the physical aspect of hunger neglects its subjective and social dimensions and excludes people that do not fit into clinical categories and bodily measurements defined by scientific standards. A contemporary example captures this aspect well. A 2018 conference paper criticized the large international advocacy in favor of identifying childhood malnutrition solely on the basis of mid-upper-arm-circumference band (MUAC) screening. The study brought evidence of how MUAC-only screening excludes hundreds of thousands of children that

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have low weight-for-height ratios and face a high risk of death.[3] Unfortunately, though predictably, the authors called for "urgent research […] to develop simple methods to identify children with low WHZ [weight-for-height z-score] at community level."[4] As Scott-Smith has sharply remarked, anthropometric measurements circumscribe hunger to a "silent physical examination", transforming the hungry into objects subjected to scientific techniques that fail to grasp the subjective and social facets of hunger.[5] As long as experts and policy makers retain a need for and resort to science-based, expedited, simplified and standardized ways to measure hunger, many hungry people will continue to go "missing."

5.1 Key Features in the Medical Arc of Hunger

In tracing the medicalization of hunger, I have shown how a medical lens became predominant and followed as a crucial explanatory framework for hunger, as well as identified a number of marked features that constitute its arrangement. The medicalization of hunger manifested through a medical scrutiny geared to investigating the starving body in its biological minutiae. Scientific studies of hunger focused on biochemical and physiological analysis and undertook sophisticated clinical, metabolic and laboratory examinations that employed scientific methodology and instruments. These hunger studies fostered the proliferation of medical categories, both to classify the degrees of starvation, distinguish different types of hunger, and guide specific

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[3] Michael H. Golden, and Emmanuel Grellety, "Death of Children with SAM Diagnosed by WHZ or MUAC: Who Are We Missing?" Research for Nutrition Conference, Action Against Hunger (2018): 76, 79-80.
[4] Ibid, 76.
[5] Tom Scott-Smith, "The Fetishism of Humanitarian Objects and the Management of Malnutrition in Emergencies," *Third World Quarterly* 34, no. 5 (2013): 923; Tom Scott-Smith, "Defining Hunger, Redefining Food: Humanitarianism in the Twentieth Century" (PhD diss., University of Oxford, 2014), 60-61.

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management protocols. A medical frame urged the implementation of immediate fixes to correct specific physiological disorders that needed to follow precise medical and nutritional schemes. A predominant medical lens called for medical interventions, which reconceptualized hunger relief as treatment. Hunger treatment moved the realm of management to medical governance, with medical expertise orienting responses that were to be medically prescribed or conducted under medical supervision. Further, with the understanding of hunger as disease, hunger was placed alongside other illnesses and its management became more readily integrated with the care of other concurrent or aggravated medical conditions. A medical framework favored the development and use of technically-engineered solutions to hunger at the same time that experts still struggled to include and make sense of the role of food, perceived more widely as medicine.

This thesis has also uncovered the global character and reach of nutrition knowledge. The medicalization of hunger came into being from a compendium of multiple hunger studies conducted across the world. The expertise that underscored the medicalization of hunger also had a marked and increasingly global nature, even though hierarchies of power underlie the diverse composition of international arrangements and influence nutrition responses. Plurality has, thus, existed amid the prevailing "top-down, controlling, and paternalistic" aspect of humanitarian feeding programs.[6] Concomitantly to a surge of interest in childhood malnutrition among Western pediatricians in developing countries in the 1950s, researchers from developing countries rose to international prominence in hunger research. While the 1950s and 1960s saw nutrition research primarily grounded on medical expertise, the 1970s diversified the field to

[6] Tom Scott-Smith, "Control and Biopower in Contemporary Humanitarian Aid: The Case of Supplementary Feeding," *Journal of Refugee Studies* 28, no. 1 (2014): 25-26.

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encompass areas in the social sciences and planning.[7] We have also seen that if up to contemporary times this trend in broadening the thematic composition of nutrition has continued, the presence and influence of medical professionals in nutrition has never disappeared. Further, even as the 1970s began to see with greater visibility more comprehensive views of hunger, a medical outlook remained vivid amid plural and coexisting paradigms that yielded a hybridity in approaches to hunger: narrow and holistic frameworks, paternalist and context-sensitive perspectives, and scientifically-engineered and locally-sourced responses.

The market has risen to occupy a central place in designing and producing emergency foods to manage hunger. The connection between nutritional science and commercial interests date from the formative stages of nutritional science.[8] From the interwar until World War II, humanitarian actors, attracted by the medical promise of food products directed at the infirm, such as Benger's Food or a proprietary protein powder formula called Casilan, employed them to relieve hunger.[9] Mead Johnson owned a blend of protein hydrolysates, the prominent hunger treatment concoction in the postwar, under the proprietary label Amigen. A number of scientific studies of the 1940s referenced the conduct of trials with Amigen, its assured biopharmaceutical safety, and promising results.[10] The commercial concoction more easily and systematically

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[7] Joshua Ruxin, "Hunger, Science and Politics: FAO, WHO, and Unicef Nutrition Policies, 1945-1978" (PhD diss., University of London, 1996), 50, 335-336, 342-343.
[8] Liebig, an influential proponent in systematizing scientific studies that shaped the development of nutritional science, endorsed food products with a "scientific seal of approval by himself." Harmke Kamminga and Andrew Cunningham, "Introduction: The Science and Culture of Nutrition, 1840-1940," In *The Science and Culture of Nutrition, 1840–1940* (Amsterdam: Editions Rodopi, 1995), 7.
[9] Scott-Smith, "Defining Hunger, Redefining Food," 148, 204-205.
[10] Some examples include: A. B. Anderson, "The Therapeutic Use of Protein Hydrolysates," *Proceedings of the Nutrition Society* 4, no. 3-4 (1946): 237-244; Conference on Therapy, "The Use of Protein Hydrolysates," *The American Journal of Medicine* 3, no. 4 (1947): 472-485; Geoffrey Evans, "Discussion:

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conformed to scientific standards, while its scientific endorsement contributed to legitimizing the commercial product. A look at the contemporary scientific literature reveals that protein hydrolysates never disappeared from the industry's sights, even as we have seen their disastrous use in managing hunger. Protein hydrolysates figure as a fundamental component in multiple food products, from sports nutrition to infant feeding and elderly diet supplements, and in specific clinical applications for, among other things, digestive or absorptive debilities.[11] Attempts at utilizing protein hydrolysates in the management of malnutrition persist. Recent studies have investigated the safety and adequacy of protein hydrolysates derived from fish sources, such as the commercial preparation Amizate® in malnutrition supplementary diets, and the beneficial role of protein hydrolysate-based infant formulas on growth and gastrointestinal protection.[12] This endurance speaks to the industry's incessant reformulation of products and its continuous attempts to capitalize upon diverse market niches as well as the unremitting attraction of ever more specialized and technical solutions to hunger.

If after World War II the market was only beginning to further the endorsement and acceptance of the benefits of medicinal foods for humanitarian use, the 1960s and 1970s moved the market to the centerstage of designing and prescribing solutions to hunger. Producing relief foods was no longer an improvised undertaking, but came to

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The Physiology and Treatment of Starvation," *Proceedings of the Royal Society of Medicine* 38, no. 7 (1945): 388-398; "Partial Starvation and its Treatment," *The Lancet* 245, no. 6343 (1945): 375-376; Robert Elman, and D. O. Weiner, "Intravenous Alimentation with Special Reference to Protein (Amino Acid) Metabolism," *Journal of the American Medical Association* 112, no. 9 (1939): 796-802.

[11] M. H. Abd El-Salam and S. El-Shibiny. "Preparation, Properties, and Uses of Enzymatic Milk Protein Hydrolysates," *Critical Reviews in Food Science and Nutrition* 57, no. 6 (2017): 1119.

[12] Nesse et al., "Safety Evaluation of Fish Protein Hydrolysate Supplementation in Malnourished Children," *Regulatory Toxicology and Pharmacology* 69, no. 1 (2014): 1-2, 4; Schmelzle et al., "Randomized Double-Blind Study of the Nutritional Efficacy and Bifidogenicity of a New Infant Formula Containing Partially Hydrolyzed Protein, a High-Palmitic Acid Level, and Nondigestible Oligosaccharides." *Journal of Pediatric Gastroenterology and Nutrition* 36, no. 3 (2003): 347-350.

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assemble a global market of its own amid the international food system. The 1960s surge of high-protein food mixtures, from fortified flours to high modernist schemes of technically-engineered solutions, consolidated the influence of commercial interests in shaping the nutritional products deployed in humanitarian contexts and cemented the allure of industrially-produced solutions to hunger in humanitarian nutrition.[13] Contemporarily, the prominent standing of Plumpy'Nut® in the arsenal of humanitarian products and the place of industry in its formulation, reflect the market's increasing centrality in nutritional responses to hunger.

A current website managed by MSF Canada clearly epitomizes the complex links between commerce, hunger, and humanitarianism. The Warehouse is a webpage in the form of a "virtual gift catalog" containing some of the humanitarian technologies MSF uses in its projects, from life jackets and tents to tool and medicine kits.[14] The page has a section devoted to "fighting malnutrition", where a donor may buy the entire collection consisting of 50 MUAC bands, a weigh scale, 100 sachets of Plumpy'Nut® and five anti-malaria treatments for $119.00. Designed as a typical online shopping experience, the webpage displays a clear and simplistic language that not only conflates RUTFs with Plumpy'Nut®, but describes the latter as "a peanut-milk paste that is easy and tasty for children to eat and filled with all of the essential vitamins, minerals, fat and protein small bodies need […] RUTF is *the perfect solution* for remote locales where refrigeration is

[13] Scott-Smith, "Defining Hunger, Redefining Food," 166-169, 194-195, 199-202, 204-205, 228-229; Tom Scott-Smith, "Beyond The 'Raw' and the 'Cooked': A History of Fortified Blended Foods," *Disasters* 39, no. 2 (2015): 245, 256.
[14] Doctors Without Borders/Médecins Sans Frontières (MSF) Canada, "The Warehouse," March 8, 2017, Updated June 28, 2018, accessed March 15, 2019, https://www.doctorswithoutborders.ca/warehouse.

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limited and clean water is in short supply."[15] Priming for marketing flair, Plumpy'Nut® is hailed as nutritionally-adequate, context-tailored and age-specific. In this portrayal, nutritional solutions that are socio-culturally sensitive are effaced, the therapeutic connotation of Plumpy'Nut® entrenches a medicalized paradigm, and quick-fix solutions are endorsed.

The humanitarian employment of technical nutritional solutions to hunger allows us to discern the broader humanitarian architecture. Increasingly after World War II but with greater intensity after the end of the Cold War, a modernized humanitarianism, through an expansive technical apparatus, augmented its hierarchical nature and distanced humanitarian actors from populations in need.[16] The over-reliance of humanitarian providers on standard and scientifically-calculated templates meant responses became theoretically mobile and flexible, but paradoxically rigid to local realities.[17] Humanitarianism became more science-centered and more adept at employing technocratic expertise.[18] It is amid this backdrop that simple, specialized and expert-devised solutions to hunger found a prominent standing in humanitarian nutrition. Further, beyond the technocratic design of humanitarianism, the urgent needs of humanitarian contexts privileged the types of technologies employed in nutritional interventions: fast-acting solutions that are wide-reaching, yet exclusionary; flexible, yet controlling; effective, yet limited.

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[15] Doctors Without Borders/Médecins Sans Frontières (MSF) Canada, "The Warehouse: Delivering Gifts That Matter," accessed March 16, 2019, https://msfwarehouse.ca, my emphasis.
[16] Barnett, *Empire of Humanity: A History of Humanitarianism* (Ithaca: Cornell University Press, 2011), 170, 234-236.
[17] Peter Redfield, "Cleaning Up the Cold War: Global Humanitarianism and the Infrastructure of Crisis Response," in *Entangled Geographies: Empire and Technopolitics in the Global Cold War*, edited by Gabrielle Hecht (Cambridge: MIT Press, 2011), 268, 271, 275.
[18] Barnett, *Empire of Humanity*, 105, 130.

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The paradox of contemporary humanitarianism, thus, sees a technocratization of aid, greatly supported by nutritional science's ability to quantify and reduce the complex multi-causalities of hunger into simple input and output equations where malnutrition is, to a significant extent, a pathology to be treated. This was never mutually exclusive from understandings that acknowledged the deeper causes of hunger, but the medical view was predominant in informing the immediate responses to hunger. Further, the professionalization and standardization of humanitarian aid has never been an inexorably rapid, progressive, stable or sweeping process.[19] The fact this trend has never been linear or monolithic hints at how the medical paradigm of hunger is not all-encompassing and has encountered tensions, which is evident in the multiple paradigms that govern the conceptualization and management of hunger. If uneven, the bureaucratic humanitarian architecture still significantly shaped more technical and circumscribed responses to hunger. At the same time that a technocratic approach is more effective in providing lifesaving aid to a far reaching extent, it falls upon what Alex De Waal terms "inescapable cruelties," such as inherently exclusionary "acts of triage," that produce seemingly detached protocols of intervention.[20]

The critical view I have presented on the medicalization of hunger and simplistic nutrition technologies does not wish to diminish the value of humanitarian activities or argue against them. Immediate responses will, unfortunately, always have a place amid

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[19] Paulmann reminds us that the common scholarly narrative that attributes professionalization, secularization and internationalization as growing features of humanitarian action in the twentieth century also needs to acknowledge the persistence of religion, the diversity and even inexperience of actors, and the national, colonial and imperial structures that still underpin humanitarianism.
Johannes Paulmann, "Conjunctures in the History of International Humanitarian Aid during the Twentieth Century," *Humanity: An International Journal of Human Rights, Humanitarianism, and Development* 4, no. 2 (2013): 219.

[20] Alexander De Waal, "The Humanitarians' Tragedy: Escapable and Inescapable Cruelties," *Disasters* 34, Suppl. 2 (2010): quote on S132, also S130-S131.

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our global troubles, but more efforts should attempt to make them locally-meaningful. I have sought to complicate straightforward accounts that portray malnutrition as an easily solvable problem, which, in turn, find an antithetical solution in specific medical protocols. The medicalization of hunger reveres nutritional science's miraculous concoctions and enables the prevalence of simplified technically-engineered fixes. History is concealed, the novelty of nutritional solutions is elevated and standardized technical solutions acquire an increasing centrality in humanitarianism. Humanitarian nutrition has placed primacy upon its urgent imperative of action and need for high-yielding efficacy, which has, unfortunately, largely been at odds with locally-integrated responses cognizant of the political causalities of hunger.

5.2 Contemporary Challenges and the Pathways Ahead

From the immediate post-World War II scenario of acute starvation, the nature of hunger emergencies has shifted. As the twentieth century pressed on, and particularly in its latter moment, the occurrence of large-scale famines has declined and endemic malnutrition prevails, both instances being localized in poverty or war-ridden contexts.[21] The geography of hunger further shifted its focus from the European setting in the postwar to developing countries and to the eminence of the African child in Western humanitarianism.[22] Currently, the international nutrition community conceptualizes the global reality of a triple burden of malnutrition, which encompasses the concurrent

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[21] Cormac Ó Gráda, *Famine: A Short History* (Princeton: Princeton University Press, 2009), 2, 6; Cormac Ó Gráda, "Making Famine History," *Journal of Economic Literature* 45, no. 1 (2007): 5-6.
[22] Eleanor Davey, John Borton, and Matthew Foley, *A History of the Humanitarian System: Western Origins and Foundations*, Humanitarian Policy Group Working Paper (London: Overseas Development Institute, June 2013), 10; Heike Wieters, "Reinventing the Firm: From Post-War Relief to International Humanitarian Agency," *European Review of History: Revue Européenne d'Histoire* 23, nos. 1-2 (2016): 122.

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existence of undernutrition, micronutrient deficiencies and overnutrition.[23] Multifarious types of malnutrition may be present in the same country and may even "exist in the same people at the *same time*."[24] Over eight million children under five years old in 106 countries are both stunted and overweight, with a greater prevalence localized in Europe and Africa.[25] The international community is not only shedding light on the coexistence of the diametrical experiences of over and undernutrition, but on the simultaneous existence of different types of undernutrition in the same individual, which the international nutrition system has yet to fully acknowledge and engage with. Almost sixteen million under-five children globally are both stunted and wasted, with the highest prevalence in Asia followed by Africa.[26] Geospatial data collection and analysis have gone so far as to indicate at subnational levels the evolution of some child malnutrition indicators, of different types and degrees, across time.[27]

In recent years, the scientific community has also coalesced around the view that the first 1,000 days of life represent the crucial period for preventing growth retardation. The focus upon the age range from conception until two years old has led to a reorientation of the programmatic focus of nutrition interventions that seek to target this vital age group. The universal scientific conception of this specific "window of opportunity," beyond which nutritional rehabilitation promotes only small or null effects

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[23] Anna Herforth, "Access to Adequate Nutritious Food: New Indicators to Track Progress and Inform Action," in *The Fight Against Hunger and Malnutrition: The Role of Food, Agriculture, and Targeted Policies*, ed. David E. Sahn (New York: Oxford University Press, 2015), 144.
[24] Ibid; Development Initiatives, *2018 Global Nutrition Report*, 42, emphasis on original.
[25] Development Initiatives, *2018 Global Nutrition Report*, 42.
[26] Ibid, 44; Carmel Dolan, and Tanya Khara, "Coexistence of Stunting and Wasting in Countries," in *2018 Global Nutrition Report: Shining a Light to Spur Action on Nutrition* (Bristol: Development Initiatives, 2018), 45.
[27] Aaron Osgood-Zimmerman et al., "Using Geospatial Data to Track Nutrition Progress in Africa," in *2018 Global Nutrition Report: Shining a Light to Spur Action on Nutrition* (Bristol: Development Initiatives, 2018), 46-47.

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on linear growth, has been further and increasingly shifting attention to children and women in nutrition programs.[28] The mounting scientific evidence on the vitality of the early stages of life and the concern for tracking the specific types of malnutrition endured by children underscores the scientific focus upon children's special vulnerability and development phase.[29] The fact that extensive, detailed, and segmented data is being generated and analyzed to track the multiple and disparate forms of malnutrition in children attests to the continuous singularity of children in attracting scientific research and becoming the target of humanitarian nutrition projects. From its inception, children have been a mainstay of the medicalization of hunger, being pivotal subjects of investigation in the discovery of kwashiorkor and in the detailed studies of the post-World War II era, generating specific medical categories, and instigating the development of differentiated protocols of management. Through time, this predominance of children has materialized in ever more specific techniques of measuring hunger and specialized solutions to manage childhood malnutrition. If the contemporary focus on children finds its historical parallels in the origins of the medicalization of hunger, children continue to increasingly occupy the limelight of humanitarian nutrition.

In highlighting the constraints of a predominant medical frame that entailed limited humanitarian responses to hunger, I have contributed to a critical body of

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[28] Jef Leroy et al., "Using Height-for-Age Difference Instead of Height-for-Age Z-Scores for the Meaningful Measurement of Catch-Up Growth in Children under 5 Years of Age," in *The Fight Against Hunger and Malnutrition: The Role of Food, Agriculture, and Targeted Policies*, ed. David E. Sahn (New York: Oxford University Press, 2015), 19, 33.

[29] Stunting and wasting are medical categories that refer specifically to children. Further, the Global Nutrition Report seems to present a gap in the global data of adult malnutrition. The Report does not bring figures for the total adult population underweight or undernourished, only for women underweight. It is unclear whether this emphasis on female data is due to their greater vulnerability, lack of interest in compiling total figures, or insufficient data to compile total numbers in the adult population. See, Development Initiatives, *2018 Global Nutrition Report*, 30-35.

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scholarship on humanitarianism, hunger and nutrition. There are many potential avenues of research in integrating these fields. Though many scholars have recently examined the multifarious links between the market, humanitarianism, and development projects, investigating the connections between technical nutritional solutions to hunger and the market constitutes an under-explored area of research.[30] While a substantial literature has looked at the special place of the child in humanitarian photography and in anchoring international sympathy for operations, more studies could uncover the particular emphasis on children in humanitarian feeding programs and in the development of specific nutrition products.[31] It would be further valuable for future studies to grapple with the constitution of the global network of knowledge on hunger. Exploring the diverse arenas where discussions and policy on hunger take place, the plural actors involved and how these arrangements shape nutritional responses will continue to shed light into the socio-historical construction of scientific edifices and de-naturalize the solutions prescribed for malnutrition. More studies could also delve into the types of expertise that underscore hunger studies: not only has medicine been integral, but

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[30] Some studies that grapple with the linkages of the market, humanitarian and development projects include: Alexander De Waal, *Famine Crimes: Politics & the Disaster Relief Industry in Africa* (London: African Rights & the International African Institute in association with James Currey, Oxford & Indiana University Press, Bloomington, 1997); Julia Elyachar, *Markets of Dispossession: NGOs, Economic Development and the State in Cairo* (Durham: Duke University Press, 2005); Jennifer Clapp, *Hunger in the Balance: The New Politics of International Food Aid* (Ithaca: Cornell University Press, 2012); Thomas G. Weiss, *Humanitarian Business* (Cambridge: Polity Press, 2013).

[31] Some examples of works on humanitarian photography and the humanitarian focus upon the child's appeal include: Friederike Kind-Kovács, "The Great War, the Child's Body and the American Red Cross," *European Review of History* 23, no. 1-2 (2016): 33-62; Heide Fehrenbach, "Children and Other Civilians: Photography and the Politics of Humanitarian Image-Making," in *Humanitarian Photography: A History*, eds. Heide Fehrenbach and Davide Rodogno, 165-199 (New York: Cambridge University Press, 2015); Kate Manzo, "Imagining Humanitarianism: NGO Identity and the Iconography of Childhood," *Antipode* 40, no. 4 (2008): 632-657; Laura Suski, "Children, Suffering, and the Humanitarian Appeal," in *Humanitarianism and Suffering: The Mobilization of Empathy*, eds. Richard A. Wilson and Richard D. Brown, 202-222 (Cambridge: Cambridge University Press, 2009); Liisa H. Malkki, "Children, Humanity, and the Infantilization of Peace," in *In the Name of Humanity: The Government of Threat and Care*, eds. Ilana Feldman and Miriam Ticktin, 58-85 (Durham: Duke University Press, 2010).

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mathematical sciences and data management have increasingly become fundamental pillars for investigations on hunger. Finally, though not exhaustively, comprehensive historical inquiries have yet to grapple with the existence of a medical framework of hunger before the twentieth century. Studies could explore the actors harboring this view, the reach and influence of such ideas and the kinds of responses elicited, thus bringing a fuller picture of how the medical paradigm has manifested through time.[32]

The historical lens employed in this study have challenged linear narratives of scientific ingenuity and situated the established medical paradigm in a longer lineage of knowledge struggles, failed nutritional attempts and enduring attraction to simplistic technical solutions. History does not provide certainty or clear directives, but helps to illuminate the contexts that generated past constructions, trends and difficulties. Fostering such awareness paves the way for more substantiated decisions in the present, while also highlighting that past experiences result from historical specificities. In this way, history opens opportunities for renewed action. The arena of historical studies of humanitarian nutrition is a fruitful and developing field that warrants more research attention and dialogue across disciplinary boundaries. The long-standing silos of research within enclosed fields should continue to be dismounted. Dialogue should be articulated not only among the scholarly community, but in bridges between the academic world and the everyday practice of humanitarian agents. The inherent tension between politics and humanitarianism need not lead to depoliticized approaches. The political theorist Wendy Brown reminds us that, "No matter its particular form and mechanics, depoliticization

[32] Two remarkable examples of a medical frame of hunger from the nineteenth century can be seen in: Joseph Ayre, *Practical Observations on Marasmus* (London: W. Ross Printer, 1818); W. Soltau Fenwick, "Report on the Pathology of Infantile Marasmus," *The British Medical Journal* 2, no. 1865 (1896): 829-833.

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always eschews power and history."[33] When engaging in studies and the practice of humanitarianism, the multiple power dynamics involved in devising and conducting humanitarian nutrition projects should not be overlooked and a historical outlook should ground analysis and the formulation of projects.

Both in regards to its conceptualization and responses, there was never a homogenous or single way to conceive of hunger. Rather, the medicalization of hunger attests to the existence of plural frameworks that have informed distinct approaches to hunger, at times complementary, at others suppressing.[34] The persistent resort to a medical connotation of hunger in humanitarianism speaks to its suitability for emergency contexts and reveals how the medical approach has established itself as an entrenched pillar of humanitarian nutrition. More than looking for precise and cure-all solutions, managing hunger should not lose sight of the need for more locally-inclusive, socio-culturally sensitive initiatives that interact with those afflicted. We need to broaden our analytical lenses: beyond medicalization, beyond an emergency discourse, beyond a strictly rational-efficient logic. Only then can we start to devise politically-mindful actions and envision transformative pathways for responding to hunger.

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[33] Wendy Brown, *Regulating Aversion: Tolerance in the Age of Identity and Empire* (Princeton: Princeton University Press, 2006), 15.

[34] Medicalization itself is not a static, all-encompassing or totalizing phenomenon, but may take shape amid the existence of multiple conceptions. Peter Conrad, *The Medicalization of Society: On the Transformation of Human Conditions into Treatable Disorders* (Baltimore: Johns Hopkins University Press, 2007), 6-7.

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