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Spotlight on Global Malnutrition: A Continuing Challenge in the 21st Century



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A FORUM: LINKING NUTRITION AROUND THE WORLD

IN 2015, MALNUTRITION continues to be a public health problem that has broad impact on health outcomes, mortality rates, and financial costs of health care around the world. People in low-, middle-, and high-income countries are all vulnerable to the grave tolls of malnutrition. Malnutrition can affect individuals of all ages—infants and young children, adolescents, adult men and women, and especially older people. Malnutrition encompasses both under- and overnutrition, as well as specific nutrient deficiencies. Undernutrition prevails in developing nations, while overnutrition (overweight and obesity) is prominent in more developed countries. The dual burden of under- and overnutrition is also observed in many countries.

Clearly, malnutrition today must be addressed at global, national, and local levels. To this end, nutrition and dietetics professionals from seven countries convened on October 17, 2014, for a forum on *Linking Nutrition Around the World*. Attendees represented countries with gross national income per capita classified as low-, middle-, and high-income levels.¹ Speakers were from North and South America, the Caribbean, Africa, Europe, and Asia. The group included nutrition and dietetics professionals from the International Confederation of Dietetic Association, the American

Overseas Dietetic Association, the Academy of Nutrition and Dietetics, and the feedM.E. Global Study Group.

A Global Call to Action

Each speaker discussed the prevalence of malnutrition, causes of the malnutrition, and interventions used to address malnutrition in his or her country. In follow-up roundtable discussions, the forum agreed on consensus messages and planned this paper as a global call-to-action on community and clinical malnutrition (Figure).

MALNUTRITION: OVERLOOKED AND UNDERTREATED

Malnutrition has been defined differently in different countries and by different organizations; therefore, the exact prevalence of malnutrition varies by the population studied and by the methods used to identify malnutrition. Malnutrition (under- or overnutrition) is linked to serious consequences, including growth stunting, increased complications during hospitalization, longer hospital stays, more hospital readmissions, increased costs of care, loss of physical and mental function, lower quality of life, and higher risk of mortality.

While multiple dietary recommendations and clinical guidelines have specified nutrition care strategies, malnutrition is still overlooked and undertreated. Barriers, such as lack of awareness; time; money; and training, have prevented health care professionals from using nutrition to full advantage.²⁻⁴ How quickly a country's health professionals screen people for nutrition risk, assess them for the presence of actual malnutrition, and provide appropriate treatment can have considerable impact on the overall health of its population. Indeed, an ever-

growing body of evidence suggests that nutrition intervention is associated with improved patient clinical outcomes and lower health care costs.⁵⁻¹⁵

Hospital Malnutrition

In the hospital setting, the prevalence of malnutrition has been reported to range from 20% to 50% of patients.¹⁶ Remarkably, these prevalence numbers are similar in hospitals of both developing and developed nations.¹⁷⁻²¹ In addition, these numbers have not changed much during the past decade. For example, Maria Isabel T. D. Correia, MD, PhD (Brazil) presented results of a classic 2000-2001 study, in which 48.1% of patients admitted to Brazilian hospitals were malnourished and 12.5% were severely malnourished²²; more than a decade later, a study found 30.2% and 22.4% of patients hospitalized in Brazil had moderate and severe malnutrition, respectively.²³ A similarly high prevalence of malnutrition was reported in hospitalized patients of 13 Central and South American countries, with malnutrition prevalence ranging from 39% to 64%.²¹ Studies from other areas of the world also report high rates of hospital malnutrition; ie, up to 10.8% of children in 12 European countries,²⁴ nearly 40% of adults in Turkey,²⁵ and 37% to 55% in the Philippines.²⁶

Community Malnutrition

In the community setting, malnutrition consequences include growth stunting, wasting, underweight, and overweight. The Table summarizes results reported at the meeting.

SCREENING, ASSESSMENT, AND DIAGNOSIS OF MALNUTRITION

The faces of malnutrition today differ greatly from classic childhood

*Certified in Zimbabwe.

†Certified in the Philippines.

‡Certified in Kenya.

Malnutrition's global impact	Strategies to address malnutrition
<ul style="list-style-type: none"> Malnutrition can occur as undernutrition, overnutrition, and/or imbalance of specific micronutrients. Malnutrition can occur in children, adolescents, and adults. Malnutrition decreases quality of life and increases risk for mortality, morbidity, and higher costs of health care. Food security affects an individual's nutritional status; food insecurity is a major contributing factor to malnutrition. 	<ul style="list-style-type: none"> Successful interventions span community and clinical settings. The community must be empowered to identify and refer people for nutrition care. Health care providers should be trained on the use of simple yet effective tools for nutrition screening and assessment/malnutrition diagnosis. There is a need to build capacity for nutrition and dietetics professionals. Policymakers and public health officials can enhance efforts to address malnutrition.

Figure. The 2015 malnutrition messages and strategies to address malnutrition.

undernutrition diagnosed as marasmus and kwashiorkor by the World Health Organization. Now a wide range of situations and conditions are recognized to increase risk for malnutrition in children, adolescents, and adults, especially older people. With such changes, health care workers in hospitals, clinics, and communities need to understand today's malnutrition and act on it.

The following are a few examples of malnutrition today, as found all around the world, regardless of a country's economic status:

1. A child or adult with food insecurity, eating low-nutrient, high-kilocalorie foods, with infection or inflammation due to an acute or chronic disease; this individual may have a high

body mass index but, in reality, have muscle wasting and micronutrient deficiencies.

2. An adolescent girl who is pregnant and has limited access to healthy foods; this person has high macro- and micronutrient needs due to fetal growth as well as her own growth requirements.
3. An older person admitted to a medical facility with a poor appetite, multiple comorbidities requiring multiple medications, and limited physical or mental function; this person may be underweight with classic muscle wasting or may be overweight but with lost lean body mass (sarcopenia).

While resources vary considerably between countries, all of the people in these examples could be diagnosed as having malnutrition. To facilitate diagnosis, we need common screening and assessment tools that are low in cost and simple to use. Ideally, a biochemical value with a defined threshold for categorization of malnutrition as "yes" or "no" would begin the process. Currently, such a measure does not exist. Therefore, simple and effective tools that can be used by a variety of

Table. Malnutrition consequences in various global community settings (reported by participants)

Country	Population	Stunting HFA-z ^a	Wasting WFH-z ^b	Underweight		Overweight/Obese BMI ^d	
				WFA-z ^c %	BMI	%	BMI
		←—————%—————→					
Turkey ²⁷	0 to 5 y	11.5	5.2	4.1		8.5	
	6 to 18 y	6.8		3.8		8.2	
	≥19 y			2.2	>18.5	30.3	≥30.3
Kenya, 2009 data ²⁸	0 to 5 y	35	7	16		5	
Zimbabwe							
2010 to 2011 Children ²⁸	0 to 5 y	32	3	10.1		5.8	
2010 to 2011 Adults ²⁹	Adult women						
	20 to 29 y						26.8
	30 to 39 y						41.5
	40 to 49 y						50.5
Venezuela ³⁰⁻³²	School-aged children	0.6 to 11.9				10.7 to 25.4	

^aHFA-z=height for age, z score.
^bWFH-z=weight for height, z score.
^cWFA-z=weight for age, z score.
^dBMI=body mass index; calculated as kg/m².

people with different skill levels in a variety of settings should be developed for training people in communities, clinics, and medical centers.

Health care workers in hospitals, clinics, and communities need to understand today's malnutrition and act on it.

First, health care professionals must understand the difference between screening and assessment.³³ To screen is to identify risk, and screening tools should be simple yet specific to the condition. Some tools are used around the world, and others have been developed locally. For example, the Malnutrition Screening Tool is a widely used tool.³⁴ On the other hand, experts in the Philippine Society for Parenteral and Enteral Nutrition have developed an Outpatient Nutrition Risk Screening Tool, used as a self-questionnaire to determine risk for undernutrition among people in the community (D. C. D. Redondo-Samin, RND, MD, PhilSPEN-Abbott National Out-Patient Nutrition Risk Survey 2012, personal communication, October 2014).

1. Have I lost weight within the last 3 months? Yes or no
2. Have I lessened food intake in the last week/3months? Yes or no
3. Do I often have difficulty eating or chewing food? Yes or no
4. Which plate best represents my daily food intake (pictures of 20%, 40%, 60%, and 80% of food eaten)?

The Philippines is a lower-middle-income country, so food insecurity is common. When the Philippine Society for Parenteral and Enteral Nutrition tool was used for screening 19,000 community patients nationwide, results showed that 42% of patients had lost weight, 40% had decreased food intake, and 23% had difficulty eating (D. C. D. Redondo-Samin, RND, MD, PhilSPEN-Abbott National Out-Patient Nutrition Risk Survey 2012, personal communication, October 2014).

In another study in Turkey, researchers used the Nutrition Risk Screening 2002 tool and found that

51.4% of hospitalized patients were candidates for full nutrition surveillance and likely candidates for intervention.³⁵

Using a simple screening tool that identifies nutrition risk may be the best that a limited-resource facility can do, thus the screening system should be as accurate and robust as possible. If use of a validated tool, such as the Malnutrition Screening Tool,³⁴ is not practical, simple questions on appetite loss or low food intake are recommended, as they have a high correlation with poor health outcomes.³⁶ If malnutrition risk is identified for individuals in community, clinic, or medical settings, such individuals should be referred to receive full assessment and treatment by a qualified nutrition and dietetics practitioner. When high risk is found, an assessment tool, such as the Subjective Global Assessment (SGA),³⁷ is used to determine whether the individual meets threshold criteria for actual diagnosis of malnutrition. If full assessment is not possible, these people should be given simple nutrition advice and interventions.

Risk Factors for Malnutrition

To implement an effective intervention, it is essential to understand factors that predispose populations to malnutrition risk. Forum participants identified age, poor socioeconomic status and food insecurity, and clinical conditions, as factors often associated with malnutrition.

Older and Very Young Ages. Older people are particularly vulnerable, especially when they have an acute or chronic health condition; a Swiss hospital study showed that those who are oldest are at highest risk of malnutrition.³⁸ A Turkish study of adults older than 65 years living in the community found malnutrition in 28% of this population.³⁹ At the other end of the spectrum, infants and young children are at high risk for malnutrition, especially in regions with food insecurity.^{24,28,29,40,41}

Poor Socioeconomic Status and Food Insecurity. Poor socioeconomic status and food insecurity are linked, so both must be addressed in order to prevent and treat malnutrition. For

example, public health professionals in Zimbabwe reviewed conditions that impact food and nutrition security (K. Chimanya, MPH, MS, RD, LD, Zimbabwe Demographic Health and National Nutrition Surveys 1994, 1999, 2006, 2011, personal communication, October 2014). Findings showed that limited food availability, high human immunodeficiency virus/acquired immunodeficiency syndrome infection rates, poor hygiene, poor infant feeding practices, bad climate for agriculture, and limited health care access all contribute to risk for malnutrition.⁴²

Acute or Chronic Disease. Forum participants reported that disease-related malnutrition (chronic or acute) can impact nutrition status in children, pregnant adolescents, and in sick or older adults. For example, it was estimated that severe acute malnutrition contributes to 12,000 child deaths each year in Zimbabwe (K. Chimanya, MPH, MS, RD, LD, Zimbabwe Demographic Health and National Nutrition Surveys 1994, 1999, 2006, 2011, personal communication, October 2014). Persistently high prevalence of human immunodeficiency virus/acquired immunodeficiency syndrome and tuberculosis contribute to chronic malnutrition in children and adults. Around the world, diarrhea, measles, malaria, pneumonia, and cancer all contribute to malnutrition in children and adults.

NUTRITION CARE: EXAMPLES OF INTERVENTIONS AROUND THE WORLD

Nutrition interventions can be focused on providing specific nutrients or whole-food supplements, giving education on nutrition practices, and resolving underlying public health issues (eg, access to safe food and water, personal hygiene or environmental sanitation, agriculture practices, and regional policies). Each of the presenters shared local or country-level interventions that had resulted in improved care or nutrition-related outcomes.

Turkey

Ayla Gülden Pekcan, PhD, described interventions in Turkish hospital and community settings using the First 1000 Days maternal education and feeding initiative for infants and

children.⁴³ Based on education and training efforts, the proportion of breast feeding mothers increased from 95% in 1993 to 96.7% in 2008, as did the duration of feeding from 13 months in 1993 to 16 months in 2008.^{44,45} Exclusive breast feeding up to 6 months increased remarkably from 1.3% in 1998 to 41.6% in 2008.^{44,45} Within the community, health professionals have implemented nutrition education programs to increase awareness of healthy nutrition, and they have collaborated updated guidelines for nutrition care.

Similarly, hospital setting interventions included distribution of books and guidelines to health care professionals, creating an action plan to raise awareness on malnutrition (*Fight against Malnutrition*),⁴⁶ and participation in nutritionDay, an international survey of nutrition care.³⁶ Results from these interventions have been positive: fewer patients lost weight during hospitalization (54% in 2006 to 39.4% in 2012), more at-risk patients, more “at-nutritional-risk” patients actually received an intervention, use of enteral products increased by 90% from 2008 to 2012, screening with validated tools increased, and increased percent of nutrition support teams in teaching hospitals.⁴⁷

Philippines

Divina Cristy D. Redondo-Samin, RND, MD, reported interventions used in Philippines hospital settings nationwide—nutrition support teams, computerization of nutrition surveillance data, collaboration between nutrition societies, development and execution of continuing medical education opportunities in medical and nutrition schools, and inclusion of enteral and parenteral solutions in hospital formularies. In addition, leaders in the Philippines lobbied congress for increases in dietitian-to-patient ratios and dietitian salaries in government and private hospitals.

Kenya

Alice A. Ojwang, MS, RD, presented study results on nutrition care in Kenyan hospitals. The survey assessed the frequency of nutrition evaluation among hospitalized patients, the availability of anthropometric and

other equipment in the hospital wards, and evidence of nutrition management in hospitals. Results found that no equipment was available for conducting anthropometric measures. Some charts contained notes on malnutrition diagnosis, diet history, and interventions with meal plans, but there were few or no follow-up notes. More staff training and equipment is needed to increase awareness and treatment of disease-related malnutrition in Kenyan hospitals.

Zimbabwe

In Zimbabwe, childhood undernutrition remains a problem and chronic malnutrition (stunting) is the issue of greatest concern. Kudakwashe Chimanya, MPH, MS, RD, LD, described multiple ways to address stunting across the country. Nutrition interventions for pregnant and lactating women include micronutrient supplementation with iron and folate; educating mothers on immediate initiation and continuation of breastfeeding for all infants; training mothers on timely and appropriate complementary feeding for young infants 6 to 23 months; provision of micronutrient supplements for infants and young children 6 to 59 months; and management of acute malnutrition in the context of illness, such as human immunodeficiency virus.

Forum participants agreed that the development and dissemination of a screening and assessment toolkit targeting community and clinical health care workers would be a valuable output.

At the public health level, Zimbabwe has taken steps to assist people of all ages (K. Chimanya, MPH, MS, RD, LD, The Zimbabwe National Food and Nutrition Security Policy 2012, personal communication, October 2014). People are encouraged to eat and are provided with access to safe and varied nutritious foods (both crops and livestock) year round, provided access to safe drinking water, and given support on basic sanitation, and education and training about hand washing.

Haiti

Marie Landy Zamor, RN, presented on the work of Partners in Health, Zanmi Lasante, a food supplement program.⁴⁸

This program targets children under age 5 years who come from underprivileged areas, precarious economic situations, or environments of food insecurity. The medical/nutritional health care system conducts community-based interventions, including family assistance and provision of food supplements. The Partner in Health program includes malnutrition prevention efforts, as well as screening, assessment, and monitoring of individuals for malnutrition risk or diagnosis. When malnutrition signs and symptoms are identified, a national nutrition protocol is followed. The program also provides nutrition education for families, training and supervision of farmers who grow a peanut food supplement (Plumpy’Nut, Nutriset), and training farmers in animal breeding and plant propagation. Finally, the program runs the production plant that produces the food supplement called Nourimanba (Partners in Health).

Nourimanba is a ready-to-use food supplement that contains sugar, peanuts, oil, dry milk, vitamins, and minerals. Between 2012 and 2013, more than 4,037 patients have been admitted to the food supplement program; 33% have had their malnutrition resolved.⁴⁹

Venezuela

Venezuela has experienced the double burden of both under- and over-nutrition. Marianella Herrera, MD, MSc, highlighted the need to improve nutrition education and care, particularly in children and adolescents, as well as pregnant women. Project Viva Venezuela Cohort Study is a multifaceted research study on pregnant adolescents and women and their newborns. The program is working to identify ways to increase pregnant women’s attendance at obstetric clinics, thereby increasing access to nutrition and other services. Project Viva, in association with the Health Department, especially monitors adolescent girls who are pregnant, with attention to food subsidy programs, school snack programs, and by studying how to improve the well-being of girls and preconceptional care.^{50,51}

Brazil

Correia presented many studies from her group on the prevalence and impact of malnutrition in hospital settings.^{21,22,52-54} In Brazil and throughout Latin America, the Federación Latino Americana de Terapia Nutricional Nutrición Clínica y Metabolismo has implemented education and training programs at medical congresses and at university programs. They have targeted bedside professionals, medical administrators, and patients and families. Study results showed that such training for health care professionals increases nutrition assessment and time dedicated to nutrition therapy.⁵⁵

Correia and colleagues have published and promoted a Nutrition Care Pathway developed through the feedM.E. initiative.^{53,56} This pathway suggests three short questions for screening patients, immediate nutrition intervention if appropriate and feasible, diagnosis with the SGA or other validated tool, and then nutrition intervention. When determining an intervention, the following questions are suggested: How much, how, and when? And what? The pathway also promotes monitoring, post-discharge planning, and routine rescreening.

SUMMARY AND CONCLUSIONS

Malnutrition as undernutrition, overnutrition, or an imbalance of specific nutrients, can be found in all countries and in both community and hospital settings around the world. The prevalence of malnutrition is unacceptably high in all settings and affects children, adolescents, pregnant women, and sick and older adults. Malnutrition has multiple underlying issues (food insecurity, chronic and acute illnesses, sanitation and safety, and aging in the community), which need to be addressed. At the same time, direct nutrition interventions (food supplements and micronutrient supplementation) help support immediate resolution of malnutrition. Awareness of malnutrition issues in the community and in clinical setting must be stimulated in order to provide better care. Different countries have implemented a wide range of interventions to prevent and treat

malnutrition. These include nutrition education, engagement of the community, resolution of sanitation problems affecting food and water, routine screening and assessment and diagnosis of malnutrition (when feasible), and food supplements and micronutrients. Such programs are achieving improved outcomes; however, further engagement and training is needed for more community and clinical health workers. Many countries lack qualified nutrition and dietetics practitioners or have low dietitian-to-patient ratios with suboptimal salaries. Thus, an increase in number of and empowerment of nutrition and dietetics practitioners is desperately needed to help prevent and treat malnutrition globally.

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STATEMENT OF POTENTIAL CONFLICT OF INTEREST

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