

ORIGINAL ARTICLE

An international survey of nutritional practices in low- and middle-income countries: a report from the International Society of Pediatric Oncology (SIOP) PODC Nutrition Working Group

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BACKGROUND/OBJECTIVES: Optimal nutritional status is important in children with cancer, as it can influence clinical outcomes. To improve the nutritional health of children and adolescents receiving treatment for cancer residing in low income and middle-income countries (LMIC), we investigated nutrition practices among these nations' institutions providing treatment for childhood cancer.

SUBJECT/METHODS: A cross-sectional survey of nutrition practice was administered to staff members at institutions providing treatment for children with cancer between 2011 and 2012. Countries classified as low income and middle income were divided by geographical region. Final analysis was performed with 96 surveys, which included 27 institutions from Asia, 27 institutions from Latin America and Caribbean, 27 institutions from Africa and 15 institutions from Europe.

RESULTS: The study found that 55% of institutions had a dietician available on their service. Access to dieticians, lack of nutrition resources and lack of nutrition education of staff were the main barriers to providing nutrition care in LMIC. Half of the institutions performed nutritional assessment at diagnosis, and the methods used varied widely. Twenty-nine percent of all institutions used complementary and alternate therapies within their clinical practice, and 35% of institutions reported that nutrition education was provided to patients and families.

CONCLUSIONS: Priority areas for improving the nutritional management in LMIC include the following: (1) improved nutrition education and assessment tools for doctors and nurses; (2) increased availability of nutrition education resources for families and patients; and (3) identification of the role of complementary and alternative therapies in closing gaps in symptom management in these institutions.

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INTRODUCTION

The majority of children with cancer live in low-income and middle-income countries (LMIC), with more than 200 000 children being diagnosed with cancer annually, compared with 50 000 in high-income countries (HICs).^{1,2} The disparity in survival rates of children from LMIC compared with children from HICs continues to widen, whereas the survival rate in HICs exceeds 75%, it remains around 20% in LMIC.¹ The need for improved resources and collaborations to improve pediatric cancer care and survival in LMIC has been highlighted and international collaborations are working toward bridging the gap between LMIC and HICs.^{2,3}

Although much has been published describing the impact of a country's economic status on provision of medical and nursing care, little is known about its impact on the delivery of nutrition services. Optimizing nutritional status is important in pediatric cancer patients, as it can influence clinical outcomes such as therapy-related toxicity, treatment response and survival.^{4–8}

Previous research has examined the variation in nutritional care in pediatric oncology institutions in HICs,^{9,10} but information about nutrition care in LMIC's pediatric oncology institutions is largely anecdotal.

International efforts are ongoing in providing education and standards of care to augment nutrition practice in LMIC.^{11,12} A comprehensive understanding of all of the considerations and barriers to the provision of nutrition care in LMIC oncology institutions remains largely unknown. Before the development of nutrition guidelines and resources, it is necessary to understand the variations in the provision of nutrition services and the defined barriers so that clinical guidelines are feasible to implement in a setting with limited resources.

As part of an ongoing effort to improve the delivery of nutrition services to children and adolescents receiving treatment for cancer residing in LMIC, we present the results of the first international survey describing variations in the provision of nutrition services among LMIC institutions providing treatment for childhood cancer.

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SUBJECTS AND METHODS

A cross-sectional survey of nutrition practices was administered to clinicians who provide care to children with cancer and are registered through online international forums or attend international research meetings in pediatric oncology. The survey was disseminated between June 2011 and April 2012. Approval was obtained from the institutional review boards at Columbia University Medical Center and St Jude's Children's Research Hospital. The survey instrument was adapted by members of the International Pediatric Oncology Nutrition Group from a survey administered by the Nutrition Committee of Children's Oncology Group⁹ and was modified to collect information pertinent to LMIC countries. The survey was piloted as a paper version to four sites, and then modified and converted to an online survey to increase response rates and reduce participant burden. The survey collected information on nutrition practice related to nutrition assessment, nutrition intervention, nutrition education and the use of complementary/alternative medicines (CAMs) in supportive care. Respondents were identified through the International Society of Pediatric Oncology (SIOP), Association de Hemato-Oncologia Pediatrica de Centro America (AHOPCA) and participants in the Cure4Kids website. Respondents were contacted by email or through the Cure4Kids platform to request participation. Respondents interested in the study were directed to Survey Monkey for completion. Surveys were also provided to clinicians at the International Society of Pediatric Oncology's bi-annual meeting in Cape Town, South Africa (March, 2012) for paper entry and sent to Columbia University for data entry into the Survey Monkey format.

To ensure a balanced representation from all institutions, one survey from each institution was included in the final analysis. The first completed response returned from the institution was included, and any surveys that were incomplete were excluded. Institutions were classified by income categories, as defined by the world bank classification of the world's economies for 2012.¹³ Countries classified as LMIC (gross national income per capital = \$12 475 or less) were included in the current analysis. The LMIC institutes were also classified according to region as per the United Nation Country Code.¹⁴ The data were analyzed using SPSS (version 21, Armonk, NY, USA) and descriptive statistics were reported. χ^2 -analysis was used to examine relationships between region and response, and Fisher's exact test was applied when the cell count was less than five. Significant findings were defined by a figure ≤ 0.05 .

RESULTS

A total of 125 staff from LMIC returned a survey. A total of 29 surveys were excluded from the analysis owing to incomplete ($N = 16$) or multiple responses from single institutions ($N = 13$). The final analysis was performed with 96 surveys, which included 27 institutions from Asia, 27 institutions from Latin America and Caribbean, 27 institutions from Africa and 15 institutions from Europe (Table 1).

Eighty-three percent of surveys were completed by a medical doctor, 6% by a dietician and the remaining by nurses, pharmacists or other health professionals. The surveys represented a range of institution sizes, with the number of new diagnoses per year less than 100 in 42% of institutions, 100 and 200 new diagnoses per year in 27% of institutions and more than 200 new diagnoses in 31% of institutions. Stem cell transplantation was provided in 37% of institutions.

Nutrition services

Of the 96 institutions, 55% of institutions had a dietician available on their service. There was no significant difference between the regions. Latin America and Caribbean had the highest number of institutions with access to dieticians (74%); however, when this was analyzed by South America versus Central America, there was a significant difference between the subregions; 93% of South American compared with 44% of Central American institutions had access to dieticians ($P = 0.01$). The main roles of the dietician in oncology were oral and enteral feeding (94%), nutritional assessment (87%) and parental feeding (64%). Seventy-one percent of LMIC had oral nutrition supplements available for their

Table 1. Survey responses by region/country

<i>Africa</i>	<i>Asia</i>	<i>Europe</i>	<i>Latin America and Caribbean</i>
Cote d'Ivoire	Georgia	Serbia	Haiti
Cameroon	Philippines	Bosnia and Herzegovina	Bolivia
Egypt	Pakistan	Belarus	Guatemala
Tanzania	Republic of China	Romania	Honduras
Uganda	Yemen	Turkey	Nicaragua
Kenya	Azerbaijan	Lithuania	El Salvador
Morocco	Bangladesh	Russia	Argentina
Nigeria	Indonesia		Brazil
South Africa	India		Colombia
Libya	Iraq		Dominican Republic
	Iran		Ecuador
	Jordan		Mexico
	Lebanon		Panama
	Malaysia		Peru
			Venezuela
			Uruguay
			Chile

patients. Analysis of all surveys found that total parental nutrition was available in 73% of institutions.

The primary barriers in providing nutrition services in LMIC institutions were finances, dietician access, resources and education of staff (Figure 1). The only significant association between LMIC region and barrier to providing nutritional service was in the education of staff ($P = 0.001$), with the majority of institutions from Asia reporting this as a significant barrier (78%). Dietician access was the most common reported barrier for African institutions (63%), and resources (55%) and dietician access (55%) were the most common barriers for European sites, whereas finances were the most common barrier for Latin America and Caribbean sites (60%).

Nutrition assessment

Fifty-five percent of LMIC hospitals performed nutritional assessment at diagnosis. Forty-nine percent of institutions performed nutrition assessment during treatment when clinically indicated (49%). The methods used to assess and categorize nutritional status are described in Table 2. All institutions used weight as a primary determinant in assessing nutrition status, with the World Health Organization growth charts being the most common reference curves used to monitor growth (60%). Other commonly used methods of nutrition assessment included nutrition-related symptoms (78%), dietary intake (63%) and laboratory indices (59%). Nutritional screening tools were used in 31% of all institutions, and 32% of institutions relied on an algorithm to guide nutrition treatment.

CAMs

Twenty-nine percent of all LMIC institutes used CAMs within their clinical practice. There was no significant variation by region. Out of the 28 institutions that used CAMs, the primary indication was 'patient interest' (78%), followed by 'physician interest' (32%), 'lack of access to conventional medicine' (25%) and 'cost' (21%).

Nutrition education and research

Thirty-five percent of institutions reported that nutrition education was provided to patients and families. In the 65% of institutions where nutrition education was not provided, lack of personnel (41%), time constraints (32%) and lack of financial support (22%) were the primary barriers. In 12% of institutions, lack of staff education was a barrier to providing nutrition education to

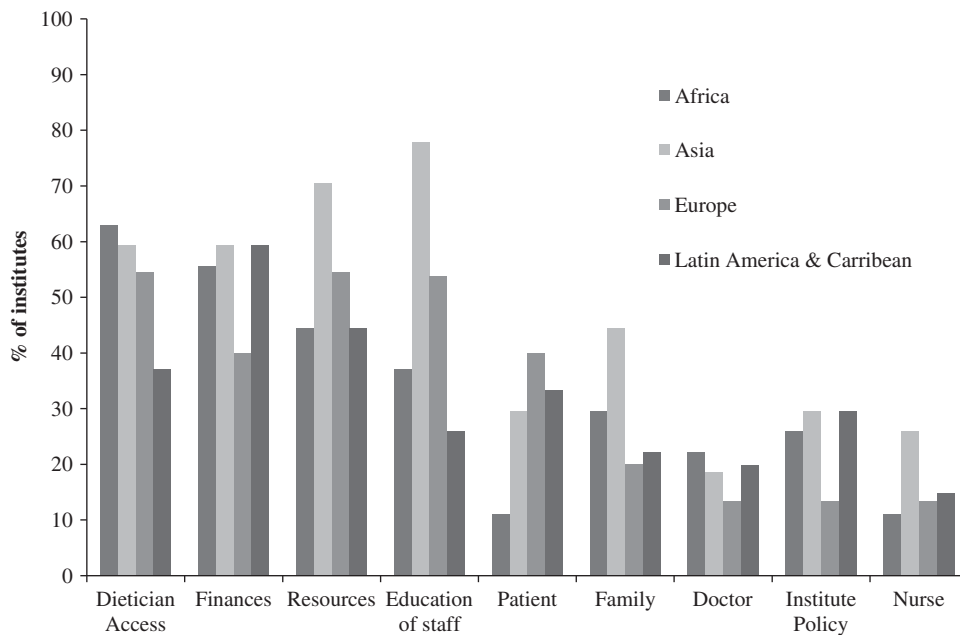


Figure 1. Institution-reported barriers to the provision of nutrition services in pediatric oncology.

Table 2. Frequencies of the use of select nutrition indices for nutrition assessment and intervention^a

Assessment method	All institutions (%)	Africa (%)	Asia (%)	Europe (%)	Latin America and Caribbean (%)
Weight	100	100	100	100	100
Weight loss	64.1	55.6	55.6	63.6	63.0
Height	96.9	96.3	100	86.7	100
Weight for height or % ideal body weight	58.7	66.7	59.3	72.7	63.0
Body mass index	50.0	40.7	51.9	63.6	51.9
Nutrition-related symptoms	78.1	70.4	70.4	86.7	88.9
Laboratory indices	62.5	51.9	70.4	46.7	74.1
Diet intake	59.4	51.9	59.3	66.7	63
Mid-upper arm circumference	33.3	48.1	25.9	33.3	25.9
Triceps skinfold	19.8	22.2	7.4	26.7	25.9

^aMore than one nutrition index may be reported by an institution.

patients/families, with a significant relationship between regions (Europe = 38%; Asia = 20%; Africa = 4%; Latin America and Caribbean = 0%; $P = 0.009$). Seventy-nine percent of LMIC institutions reported an interest in participating in research studies.

DISCUSSION

This study presents the results of the first international survey exploring variations in nutrition practice among institutions residing in LMIC and providing treatment for childhood cancer. This study is the first to identify target areas for nutrition research and education that are region specific. With this information, a framework for guidelines may be developed that is considering the unique conditions reported by LMIC institutions.

This survey identified the main barriers in providing nutrition services in LMIC institutions to be dietician access, resources and education of staff. The observation that only around half of the institutions had access to a dietician identifies an important consideration when developing clinical guidelines and professional education. Efforts aimed at improving nutrition education and providing nutrition resources needs to be focused on clinicians, nurses and other specialists residing in the institution, as these members of the medical team have a large role in LMIC in prescribing nutritional care.

Online education, regional consortiums and modifying education resources to be culturally appropriate are all strategies that can be used to improve nutritional care in LMIC. The use of online teaching forums such as Cure4Kids may provide an ideal forum to educate clinicians, which has been a successful tool in enhancing front-line care. Maximizing established regional consortiums may also enhance the delivery of nutrition education programs. This may be best exemplified by the success of the AHOPCA in improving the recognition and establishment of nutrition services to centers providing treatment for children with cancer in Central America.¹⁵ Collaborations with key members in LMIC will aid in the development of culturally appropriate educational resources to guide staff on providing nutrition education to patients and families including low literacy caregivers. This strategy has demonstrated success in improving the delivery of nutrition education to families residing in El Salvador and Guatemala.¹⁵

The survey found that nutritional assessment was most commonly performed when clinically indicated rather than as a routine or screening measure. Interestingly, nutrition assessment at diagnosis was higher than that reported among institutions residing in HICs. A previous survey performed among institutions participating in Children's Oncology Group found that only 46% of institutions performed nutrition assessment diagnosis compared with 55% of institutions participating in the current survey.⁹

Both figures are lower than a survey performed in 21 institutions residing in the United Kingdom and Ireland that reported that 100% of institutions perform nutrition assessment at diagnosis, although the frequency of subsequent assessments varied among respondents.¹⁰

Given the high prevalence of malnutrition among children residing in LMIC^{7,16} and the association between malnutrition and survival in children with cancer,^{4–8} nutrition assessment at diagnosis and throughout treatment becomes an increasingly important factor in providing treatment for children with cancer in LMIC. Adoption of a uniform nutrition screening tool within protocols guiding medical care may enhance the consistency at which nutrition assessment is accomplished and reduce the costs of treatment that may be associated with malnutrition by identifying the problem earlier. This is an area of future research.

Our survey found that there is a wide variability of indices used to classify nutritional status, with weight being the only uniform measure of assessment. The World Health Organization recommends the use of weight for height and mid-upper arm circumference (MUAC) for children 6–60 months to identify malnutrition and body mass index (BMI) in children over 5 years for identifying overnutrition and undernutrition.^{17,18} MUAC has been recommended by AHOPCA and SIOP PODC as a simple indicator of nutritional status in children with cancer.^{11,19} This study found that 50% of respondents used BMI and 33% used MUAC as part of their nutritional assessment. This suggests an opportunity for increased education and awareness about the application of using BMI and MUAC in children with cancer in LMIC and recognizing the limitations of simple methods of nutritional status in children with cancer.²⁰ Incorporating clinical features associated with malnutrition into guidelines and algorithms designed for LMIC may also facilitate the identification of poor nutrition status, especially among institutions with limited access to measures of height, weight and MUAC.

An important finding of this survey is that clinical tools that drive nutrition practice need to be flexible with the resources of the local institutions directing the local practice. Targeting aspects of clinical care, which require dietetic knowledge or interventions that are not accessible to LMIC will likely fail in improving the delivery of nutritional care. It is clear from the findings of this study that guidelines cannot be uniform and a modifiable approach is necessary. This approach has improved front-line care, as well as other aspects of supportive care, in pediatric oncology.

The observation that 29% of institutions incorporate CAMs into their practice suggests an area for research and education. Evidence-based CAMs therapies may be of benefit to local institutions that may have limited access to prescription drugs. For this to be implemented, CAMs therapies should be reflective of local resources and easily accessible to the practitioners. Concerns of potential interactions and adverse events must be weighed in view of risks versus potential benefits of incorporating local CAMs practices into clinical care. A model for the successful evaluation of CAMs therapies has been developed and may be applied to other settings including institutions residing in LMIC.^{21,22}

There are a number of limitations of the described study. First, the identification of institutions caring for children with cancer was through established research forums, interest groups or international societies. It is plausible that a bias sample was obtained owing to institutions being invited based on participation in these established forums. Future surveys may consider expanding the regional representation and working with local health authorities to ensure representation from a variety of institutions providing care for children with cancer. Future surveys may also consider obtaining responses from multiple individuals at a single institution, as individual responses may not be representative of the institution.

In summary, supportive care interventions must be cognizant of challenges inherent to institutions residing in LMIC. This study is the first of an international effort aimed at improving the delivery of nutritional care in children with cancer and has identified targets for education, resources and interventions for LMIC. Research is also an acknowledged need, which will provide an opportunity to systematically measure key issues related to improving nutritional care in LMIC.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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