

# Nutrition education tools for primary school children in the Vaal region

Wilna H Oldewage-Theron & Carin E Napier

*South Africa's high prevalence of malnutrition severely affects children's well-being and ability to learn. According to the World Bank, malnutrition is found in households from all spheres of life, since caregivers are not well informed about healthy food choices and feeding practices. A long-term solution to the problem is to encourage people to grow food and improve their incomes, but a quicker solution is to provide health and nutrition education and services to encourage healthy food choices. This paper describes the development of nutrition education tools (NETs) as part of a nutrition education programme for primary school children (Grades 1 to 3) from low-income households in South Africa. The study used the Food and Agriculture Organization's framework for nutrition education to develop simple, cost-effective, appropriate and applicable NETs.*

**Keywords:** primary school children; nutrition education; nutrition education material; nutrition education programme; nutrition education tools

## 1. Introduction

South Africa suffers from a triple burden of disease, with a prevalence of over- and under-nutrition as well as HIV/AIDS (Steyn et al., 2006). This situation affects people's well-being and quality of life, with direct consequences for the country's economic growth, in the form of increased health care costs, and indirect consequences as a result of the physical effect on children, which is typically poor cognitive function, resulting in poor attention at school. It is estimated that malnutrition can result in a loss of 2 to 3% in Gross Domestic Product and should thus be addressed as a matter of urgency (World Bank 2006:1).

Malnutrition is not confined to poor households: people from all spheres of life may be ill-informed about food choices and feeding practices (World Bank 2006:10). Food production and improvement in incomes should of course be encouraged as a long-term solution, but a more immediate solution is to provide health and nutrition education and services (World Bank 2006:10), since healthy food choices can make a meaningful contribution. Dietary recommendations, based on scientific evidence, provide guidance to such choices (Kris-Etherton, 2004). The persistent incidence of malnutrition indicates a disparity between dietary recommendations and intake behaviour (Kris-Etherton, 2004). Nutrition education is thus urgently needed to implement structural dietary and lifestyle changes in long-term food and dietary intake behaviour (Brug, 2004; Blom-Hoffman, et al., 2004; Houts et al., 2006). Very little research has been done on the impact of nutrition education programmes in lower socioeconomic populations, either globally (Swindle et al., 2007:205) or in South Africa.

From 2002 to 2006, various baseline surveys were conducted in the urban areas of the Vaal region (Oldewage-Theron et al., 2005, 2006; Oldewage-Theron & Slabbert, 2008). The

---

Respectively, Professor and Director, Institute of Sustainable Livelihoods, Vaal University of Technology; and Associate Professor, Department of Food and Nutrition, Durban University of Technology, South Africa. Corresponding author: carinn@dut.ac.za

results indicated poverty and household food insecurity resulting in poor health and malnutrition, in particular stunting and underweight in children, as well as micronutrient deficiencies across the life span, which could be exacerbated by the high level of illiteracy (Oldewage-Theron et al., 2005; Labadarios et al., 2008) and low nutrition knowledge (Napier & Oldewage-Theron, 2005) in this region. A holistic health intervention programme was planned and implemented in the Vaal region from 2007. It included a number of sustainable community based intervention projects, such as:

- increasing agricultural productivity by encouraging and supporting home gardens to address the underlying causes of household food insecurity,
- dietary diversification by means of novel product development to address specific nutritional needs as a result of household food insecurity, and
- school feeding programmes to address micronutrient deficiencies in the children.

Nutrition education was then implemented as an umbrella programme for these projects, to improve children's and caregivers' nutrition knowledge and to empower these communities to make healthy food choices in future to promote public health (Anderson et al., 2004; Brug, 2004; Vijayapushpam et al, 2008). This was done by developing, implementing and evaluating a nutrition education programme (NEP). This paper describes the development of the nutrition education tools (NETs) that formed part of this NEP for primary school children (Grades 1 to 3) from low-income households in South Africa.

## **2. Methods**

The Food and Agricultural Organization's framework for a nutrition education programme, which provides a logical development process based on scientific principles, was used to develop the NETs (FAO, 1998). The framework has four phases: (1) preparation, where the nutritional problems and their causes are identified, (2) formulation, where the objectives, messages and media are developed, (3) implementation, where the materials are produced, the change agents are trained and the programme is implemented, and (4) evaluation. The formulation phase is the focus of this paper. The following sections describe the three components.

### **2.1 Setting the objectives**

An Integrated Nutrition Programme (INP) was developed from the recommendations of the Nutrition Committee appointed in 1994 by the Minister of Health to develop a nutrition strategy for South Africa. The Committee recommended an integrated approach to nutrition to replace the fragmented food-based approaches of the past. Within the broader policy context the INP combines direct nutrition interventions such as nutrition education and micronutrient supplementation with indirect interventions such as health care and provision of safe and clean water to address the causes of malnutrition. The mix of interventions includes service delivery as well as behaviour change aspects (Department of Health [DoH], 2003). The INP includes nutrition promotion, education and advocacy as one of a set of strategies to address malnutrition in the South African population (DoH, 2003; Bourne et al., 2007).

The South African food-based dietary guidelines (FBDGs) were developed to supplement the INP strategy of nutrition education to optimise the nutritional status of the South African population aged seven years and older (Vorster et al., 2001). For this reason, the objectives set for the NEP were based on these guidelines.

## **2.2 Choosing the messages**

Children should be consuming a wide variety of foods: meat, chicken, fish, eggs, dairy products, fruit, vegetables, cereals and starch-containing foods (Bowley et al., 2007). The South African FBDGs recommend that children enjoy a variety of meals, but since they do not mention quantities Briend (2007) suggests that families may underestimate what is really needed. It was therefore decided to include in the messages in the educational materials not only the five food groups but also the required number of daily servings. Personal and food hygiene advice were also included, since in developing countries food may be contaminated by polluted water running onto agricultural lands and vegetables, by insects and rodents, and by children playing in polluted environments (Ehiri & Prowse, 1999). The World Health Organization reported that 1.8 million people died in 2005 from diarrhoeal diseases caused by unsafe food and water (WHO, 2007).

## **2.3 Media choice and design**

A pilot study was undertaken during March 2007 to identify the nutrition education practices and needs in the Vaal region. A questionnaire was developed to elicit information about nutrition education practices in the schools, the grades in which nutrition education were included as part of life skills training, the types of resources available for nutrition education, where nutrition knowledge was obtained and what the nutrition education needs were in terms of knowledge, tools and other resources. The questionnaire was developed specifically for the life skills teachers and tested for equivalence reliability (Cronbach's alpha). Completed questionnaires were received from 29 primary school teachers in a purposive sample of English medium of instruction primary schools in the Vaal region. Almost all of the teachers (27) said that nutrition formed part of the Life Orientation syllabus; however, just over half of them (17) said that only 30 to 60 minutes per week were allocated for this. No nutrition education resources or tools were available and most of the teachers recommended the use of these as appropriate educational tools for primary school children in all grades where English is the medium of instruction, with 22 saying they would like activity books, 20 wanting card and board games, and 19 wanting puzzles.

A text and activity book for children aged seven and above, as well as a board and card game and a food puzzle to supplement the book, were thus chosen as tools for this study. The first step in the development process was an extensive literature review and retail investigation by means of internet searches and visits to shops selling computer software, books and educational toys, to determine the availability of different types of NETs available on the market, both imported and local.

The second step was to determine the content of the NETs, on the basis of the South African FBDGs, and write the text to meet the objectives or learning outcomes in easily understood English.

The third step was the technical presentation of the NEP material. Graphic designers were consulted to assist with the drawings and the layout of the NETs. Once prototypes of the NETs had been developed, a registered dietician verified their scientific accuracy and a language editor proofread them for linguistic accuracy. A specialist from the Department of Visual Arts and Design at the Vaal University of Technology tested the drawings and images for visual representational latitude (comprehensibility and clarity of the images and text used) on a group of 48 primary school children (Gaede &

Oldewage-Theron, 2007:5–6). A teacher resource book giving the answers to the worksheets and instructions on the classroom activities was also designed as part of the NETs.

In the final step all the recommendations of the various consultants were addressed, 100 copies of all the NETs were produced, and provisional patents were registered for the board game and food plate puzzle.

Ethical approval was obtained from the Medical Ethics Committee for research on human beings at the University of the Witwatersrand (M080931 and M080365). All field work was conducted according to the South African Medical Research Council ethics guidelines for research on humans.

### **3. Results and discussion**

Research has shown that dietary habits in childhood have a direct impact on growth, development and the prevalence of disease throughout the life cycle. Healthy eating habits should thus be established during childhood (Anderson et al., 2004:650; Sharma et al., 2008:362). Children can be taught about nutrition from an early age. Matvienko, for example, shows that children as young as six and seven years can be empowered to make more healthful food choices through food and nutrition education (2007:284).

The specific learning outcomes formulated by the researchers for the NETs were as follows. Children were to be able to

- recognise and understand the South African FBDGs;
- identify the five food groups, their function in the diet and how to combine these food groups into a balanced meal;
- identify the sources and know the functions of the various nutrients, including macro- and micronutrients, in the body; and
- understand how to practise sound personal and food hygiene.

The literature and retail investigation showed that a number of NETs were available in overseas countries such as the United States, but would be very expensive to import. Furthermore, the nutrition content in these NETs would not be applicable to the South African context since the US dietary guidelines are different in the US, and some of the food items included in the US NETs would be unfamiliar to children in South Africa, such as pretzels, and also some of the terminology, such as ‘French fries’ for ‘chips’. No NETs were available in any of the South African retail stores and bookshops, and no research was found in which any NETs had been developed specifically for children in South Africa.

A variety of teaching methods and communication tools such as classroom discussions, worksheets, plays, posters, games and computer-based materials have been developed that can be used in nutrition education (Vijayapushpam et al., 2008:108). Although students today relate well to computers in the learning environment (Schroeder, 1993), research has found no significant differences between the effectiveness of classroom-based and computer-based methods (Raghunatha et al., 2007). However, neither type of material was available for nutrition education in South Africa. Keeping in mind the Vaal region’s high rates of poverty (Oldewage-Theron & Slabbert, 2008) and illiteracy (Oldewage-Theron et al., 2006), and the teachers’ responses to the pilot study questionnaire, an affordable and simple text and activity book with a supplementary card and board game was developed to fill the gap.

The book contains theoretical information, with supporting illustrations on food groups, the South African FBDGs and hygiene, and activities such as colouring in, matching pairs, word searches and crossword puzzles to reinforce the scientific content. It has four chapters: chapter one introduces basic nutrition, food groups and portion sizes; chapter two explains the functions of the various nutrients in the body and describes food sources; chapter three lists the South African FBDGs and discusses hygiene; and chapter four contains the activities. There are worksheets at the back of the activity book. The visual representation latitude results indicated that the images and text used in the activity books and supplementary NETs could be used for children from Grades 1 to 3. It was assumed that if children in these grades could understand the messages and images, then so could children in the higher grades. These NETs could therefore be used in the life skills training programmes as entry level nutrition education, since they cover the basics of nutrition. Once the teachers have worked through the activity book they will have to resort to other resources for more advanced nutrition education.

The text and activity book was further supplemented by a card game with 24 cards and a board game, which reinforce the content of the book. Each card in the card game has an image and message on one side and the letter of the alphabet that matches the image on the other (Figure 1). Two sets of cards are packaged together in a small box.

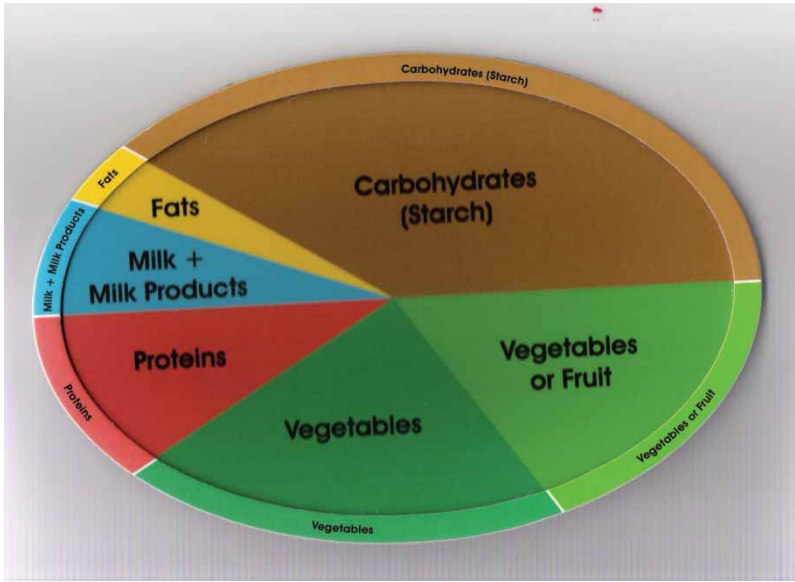
The board game, called 'Slides and ladders', is played on a board with a zigzag pattern of 42 blocks. The game starts at the bottom left-hand corner and finishes in the 'winner' square at the top. Some blocks carry a nutrition message, either 'good for you' or 'not so good for you'. A 'good for you' message takes the player up a ladder; a 'not so good for you' message sends the player down a slide. Supplied with the game are a dice and four plastic counters in different colours (Figure 2).

The food plate puzzle was developed to teach the children about balanced meals in terms of food groups and portion sizes. The puzzle is in the form of a plate with the various food groups printed on it in different colours (e.g. brown for starchy foods, red for protein-rich foods, yellow for fat, white for dairy food items, and green for the vegetable and fruit groups) and marked with the portion sizes appropriate for each food group. Puzzle pieces representing the food groups are included for the children to build a variety of plates of food. This can teach them to exchange different food items in the food groups (Figures 3 and 4).



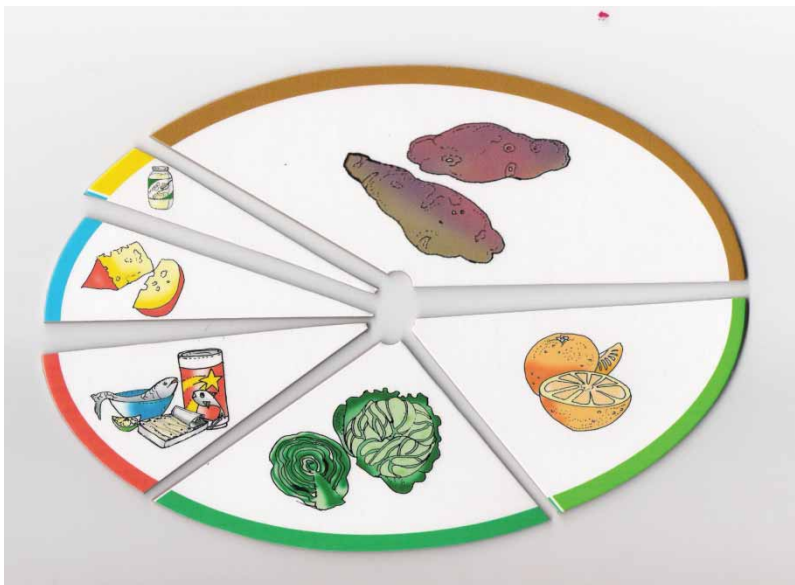
Figure 1: Examples of cards





**Figure 3: Food plate puzzle board**

Significant improvements in knowledge and behaviour were observed among children who participated in a classroom experiment using NETs, involving teachers in a Zambian school (Sherman & Muehlhoff, 2007:341). The NETs developed in the present study will employ the teachers as change agents for the implementation of the programme. The activity books were designed so that teachers could be trained to explain the basic nutrition guidelines to the children using the information supplied in the book. The children should then be guided through the activities so that learning can take place while having fun. The teacher resource book supplies the necessary support for the teachers.



**Figure 4: Examples of food puzzle pieces**

Auld et al. (1998:268) state that one of the essential elements of a successful school-based NEP is culturally relevant content presented in an active and entertaining way. The games and activities in the NETs are intended to make the nutrition learning experience enjoyable. The South African FBDGs were considered appropriate for inclusion since they had been specifically tested in South Africa for comprehensibility and cultural acceptability, affordability and sustainability, among other things (Vorster et al., 2001). The role of NETs is also central to the success of a nutrition education programme. They should be simple and cost-effective and it is recommended that children should be able to take them home (Sherman & Muehlhoff, 2007:341). The text and activity book and games described here are small enough to fit in any school bag and light enough to carry.

#### **4. Conclusions and recommendations**

South Africa is a developing country with limited resources available for prevention of public health problems such as malnutrition, which is found in a large proportion of its population, particularly children. Very little research has been done on nutrition education as a means to improve the nutritional status of South African children and this is one of the first studies that focuses on the development of simple, cost-effective, appropriate and applicable nutrition education tools that can be implemented as part of a NEP for primary school children aged seven and above. It has the potential to empower them with knowledge and skills to make healthy food choices for future health that could result in productive workers and benefit the economy of the country.

The NETs described in this paper will, however, be validated in an experimental field test for ease of use, comprehensibility and acquisition of knowledge in primary school children, including ages eight to 14 years, as well as for teachers. The results of the test will be used to revise and finalise the NETs before publication and implementation into a large-scale NEP where they can be tested for effectiveness before national rollout.

#### **Acknowledgements**

The authors wish to thank the teachers for participating in this project, Professor Rolf Gaede and his team for the first phase illustrations, Dijana Wilson, Fred Bezuidenhout and Boitumelo Kembo for the graphic design, typesetting and layout, and Sue Neumann from Print Core for printing the NETs. The project was funded by SANPAD.

#### **References**

- Anderson, AS, Porteus, LEG, Foster, E, Higgins, C, Stead, M, Hetherington, M, Ha, MA & Adamson, AJ, 2004. The impact of a school-based nutrition education intervention on dietary intake and cognitive and attitudinal variables relating to fruits and vegetables. *Public Health Nutrition* 8(6), 650–6.
- Auld, GW, Romaniello, C, Heimendinger, J, Hambidge, C & Hambidge, M, 1998. Outcomes from a school-based nutrition education program using resource teachers and cross-disciplinary models. *Journal of Nutrition Education* 30(5), 268–80.
- Blom-Hoffman, J, Kelleher, C, Power, TJ & Leff, SS, 2004. Promoting healthy food consumption among young children: Evaluation of a multi-component nutrition education program. *Journal of School Psychology* 42, 45–60.
- Bourne, LT, Hendricks, MK, Marais, D & Eley, B, 2007. Addressing malnutrition in young children in South Africa. Setting the national context for paediatric food-based dietary guidelines. *Maternal and Child Nutrition* 3(4), 230–8.



- Bowley, NA, Pentz-Kluyts, MA, Bourne, LT & Marino, LV, 2007. Feeding the 1–7 year old child. A support paper for the South African paediatric food-based dietary guidelines. *Maternal and Child Nutrition* 3(4), 281–91.
- Briend, A, 2007. Establishing food-based dietary guidelines for children: The challenge. *Maternal and Child Nutrition* 3(4), 224–6.
- Brug, H, 2004. Changing consumer behaviour from a health promotion perspective: Barriers and triggers. Unilever Health Institute Symposium Series: Scientific & Communication Issues Relevant to Consumer Health and Vitality – The Healthy Choice an Easy Choice. Unilever Health Institute, Vlaardingen.
- DoH (Department of Health), 2003. Integrated Nutrition Programme (INP). Government Printer, Pretoria.
- Ehiri, JE & Prowse, JM, 1999. Child health promotion in developing countries: The case for integration of environmental and social interventions? *Health Policy and Planning* 14(1), 1–10.
- FAO (Food and Agriculture Organization of the United Nations), 1998. *The Right to Food in Theory and Practice*. Publishing Management Group. FAO Information Division, Rome.
- Gaede, RJ & Oldewage-Theron, WH, 2007. Global visuals? Cultural diversity and visual communication. Proceedings of the 57th Annual ICA Conference – Creating Communication: Content, Control & Critique. [http://convention2.allacademic.com/one/ica/ica07/index.php?cmd=ica07\\_access](http://convention2.allacademic.com/one/ica/ica07/index.php?cmd=ica07_access) Accessed 26 November 2008.
- Gross, SM & Cinelli, B, 2004. Coordinated school health program and dietetics professionals: Partners in promoting healthful eating. *Journal of the American Dietetic Association* 104(5), 793–8.
- Houts, P, Sharada, S, Klassen, AC, Robinson, EB & McCarthy, M, 2006. A problem solving approach to nutrition education and counselling. *Journal of Nutrition Education and Behaviour* 38(4), 254–8.
- Kris-Etherton, PM, 2004. Dietary advice and practice. In Unilever Health Institute Symposium Series: Scientific & Communication Issues Relevant to Consumer Health and Vitality – The Healthy Choice an Easy Choice. Unilever Health Institute, Vlaardingen.
- Labadarios, D, Swart, R, Maunder, EMW, Kruger, HS, Gericke, GJ, Kuzwayo, PMM, Ntsie, PR, Steyn, NP, Schloss, I, Dhansay, MA, Jooste, PL, Dannhauser, A, Nel, JH, Molefe, D & Kotze, TJW, 2008. The national food consumption survey-fortification baseline (NFCS-FB-1): South Africa, 2005. *South African Journal of Clinical Nutrition* 21(3), 245–300.
- Matvienko, O, 2007. Impact of a nutrition education curriculum on snack choices of children ages six and seven years. *Journal of Nutrition Education & Behaviour* 39(5), 281–5.
- Mukoma, W & Flisher, AJ, 2004. Evaluation of health promoting schools: A review of nine studies. *Health Promotion International* 19(3), 357–68.
- Napier, C & Oldewage-Theron, WH, 2005. Knowledge of food based dietary guidelines and nutritional status of primary school children in an informal settlement. In Vorster, HH, Blaauw, R, Dhansay, MA, Kuzwayo, PMM, Moeng, TLI & Wentzel-Viljoen, E (Eds), *Proceedings of the 18th International Congress of Nutrition, 19–23 September, Durban*. Annals of Nutrition and Metabolism. Karger Medical and Scientific Publishers, Basel, Switzerland.
- Oldewage-Theron, WH & Slabbert, TJC, 2008. Impact of food and nutrition interventions on poverty in an informal settlement in the Vaal region of South Africa. *Proceedings of the Nutrition Society* 67, 91–7.
- Oldewage-Theron, WH, Dicks, EG, Napier, CE & Rutengwe, R, 2005. Situation analysis of an informal settlement in the Vaal Triangle. *Development Southern Africa* 22(1), 13–26.
- Oldewage-Theron, WH, Dicks, EG & Napier, CE, 2006. Poverty, household food insecurity and nutrition: Coping strategies in an informal settlement in the Vaal Triangle, South Africa. *Public Health* 120(9), 795–804.
- Raghunatha, RD, Vijayapushpam, T, Subba, RGM, Anthony, GM & Sarmak, VR, 2007. Dietary habits and effect of two different educational tools on nutrition knowledge of school going adolescent girls in Hyderabad, India. *European Journal of Clinical Nutrition* 61, 1081–5.
- Schroeder, CC, 1993. New students: New learning styles. *Change* 25(5), 21–6. [www.jstor.org/stable/40177728](http://www.jstor.org/stable/40177728) Accessed 1 June 2010.

- Sharma, SV, Gernand, AD & Day, RS, 2008. Nutrition knowledge predicts eating behaviour of all food groups except fruits and vegetables among adults in the Paso del Norte region: *Qué sabrosa vida*. *Journal of Nutrition Education & Behaviour* 40(6), 361–8.
- Sherman, J & Muehlhoff, E, 2007. Developing a nutrition and health education program for primary schools in Zambia. *Journal of Nutrition Education and Behavior* 39(6), 335–42.
- Steyn, NP, Bradshaw, D, Norman, R, Joubert, J, Schneider, M & Steyn, K, 2006. Dietary Changes and the Health Transition in South Africa: Implications for Health Policy. *The Double Burden of Malnutrition Case Studies from Six Developing Countries*. FAO (Food and Agriculture Organization of the United Nations), Rome.
- Swindle, S, Baker, SS & Auld, GW, 2007. Operation frontline: Assessment of longer-term curriculum effectiveness, evaluation strategies, and follow-up methods. *Journal of Nutrition Education and Behaviour* 39(4), 205–13.
- Vijayapushpam, T, Subba Rao, GM, Antony, GM & Raghunatha RAO, D, 2008. Nutrition education for student community volunteers: A comparative study of two different communication methods. *Food & Nutrition Bulletin* 29(2), 108–12.
- Vorster, HH, Love, P & Browne, C, 2001. Development of food-based dietary guidelines for South Africa: The process. *South African Journal of Clinical Nutrition* 14(3), s3–s6.
- Wechsler, H, Devereaux, RS, Davis, M & Collins, J, 2000. Using the school environment to promote physical activity and healthy eating. *Preventive Medicine* 31, s121–s137.
- WHO (World Health Organisation), 2007. Food safety and foodborne diseases. [www.who.int/mediacentre/factsheets/fs237/en/print.html](http://www.who.int/mediacentre/factsheets/fs237/en/print.html) Accessed 3 June 2010.
- World Bank, 2006. *Repositioning Nutrition as Central to Development: A Strategy for Large-scale Action*. World Bank, Washington, DC.

Copyright of Development Southern Africa is the property of Routledge and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.