Guest Editorial

- Addressing Undernutrition in Mothers and Children

CPD Articles

- Attributes contributing to the development of professionalism as described by dietetics students
- Challenges to implementing the food-based dietary guidelines in the South African primary school curriculum: a qualitative study exploring the perceptions of principals and curriculum advisors

Research

- The magnitude and determinants of anaemia among refugee preschool children from the Kebribirah refugee camp, Somali region, Ethiopia
- Child factors associated with complementary feeding practices in Uganda

Short Report

- Skimmed milk as a determinant of vitamin A deficiency

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Conditions reported by patients include:

The University of York conducted an independent patient survey (2007), involving 5286 patients who eliminated their trigger foods after being tested for food intolerance food-specific IgG testing. The results were divided into groups and summarised below:

<table>
<thead>
<tr>
<th>Main Condition Reported</th>
<th>% of people who reported a benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrointestinal e.g. IBS, Bloating etc</td>
<td>80%</td>
</tr>
<tr>
<td>Respiratory e.g. Asthma, Sinusitis, Rhinitis</td>
<td>72%</td>
</tr>
<tr>
<td>Neurological e.g. Migraine, Headaches, ME</td>
<td>78%</td>
</tr>
<tr>
<td>Dermatological e.g. Eczema, Acne, Psoriasis</td>
<td>76%</td>
</tr>
<tr>
<td>Musculoskeletal e.g. Arthritis, Joint Aches &amp; Pains</td>
<td>64%</td>
</tr>
<tr>
<td>Psychological e.g. Depression, Anxiety</td>
<td>81%</td>
</tr>
<tr>
<td>Others e.g. Lethargy, General feeling of Malaise</td>
<td>79%</td>
</tr>
</tbody>
</table>

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- Lorisian 150plus was developed by one of the world’s leading laboratories specialising in food intolerance testing, established in 1982.

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EDITORIAL POLICY

1. The Journal accepts articles from all basic and applied areas of dietetics and human nutrition, including clinical nutrition, community nutrition, food science, food policy, food service management, nutrition policy and public health nutrition.

2. The Journal has a broad interpretation of the field of nutrition and recognizes that there are many factors that determine nutritional status and that need to be the subject of scientific investigation and reported in the Journal.

3. The Journal seeks to serve a broad readership and to provide information that will be useful to the scientific community, the academic community, government and non-government stakeholders in the nutrition field, policy makers and industry.

4. The Journal encourages articles from all investigators in the field of dietetics, food, nutrition and related areas. In particular young researchers and researchers from historically disadvantaged backgrounds will be encouraged and supported to submit their research work for publication.

5. The Journal is based in South Africa and encourages articles from other African countries to act as a forum for the discussion of African nutritional issues.

6. The Journal is committed to high scientific and ethical standards.

7. The Journal will accept letters for publication, which are relevant to the Journal.

8. The Journal provides a forum for publication of congress abstracts, supplements, short communications and policy statements with their technical support papers.

9. The views expressed in the Journal are those of the authors and not necessarily those of the Editorial Board.

10. The Journal will be managed by an Editor and Editorial Board with the following responsibilities:

- Maintenance of scientific standards of the articles published and appointment of a review Panel of experts for the peer review process
- Maintenance of ethical standards of the articles published
- Encouragement and support of authors
- Promotion of the readership
- Ensuring the spread of articles published

11. Maintenance of ethical standards with regard to sponsorship and advertisements

12. The Editorial Board of the SAJCN recognises the important role that advertisements and sponsorships play in meeting the costs of the publication and in ensuring the continued existence of the Journal. The SAJCN welcomes advertising or funding from all possible sources, provided the advertisements or funding arrangements are supportive of the objectives of the Journal and do not conflict with the mission, vision and values statements of ADSA, NSSA and SASPEN. The following guidelines shall be implemented for sponsorship and advertising:

- The Jakarta Declaration, which clearly stipulates that "both the public and the private sector should promote health by pursuing policies and practices that ….. restrict production and trade in inherently harmful goods and substances such as tobacco and armaments, as well as unhealthy practices"

- Advertised products or services must be in compliance with Act 101, "The Code of Practice for the Marketing of Medicines in RSA", the National Drug Policy and regulations of the Medicines Control Council (MCC), Health Profession Council of SA (HPCSA) and the South African Code for the Marketing of Breastmilk Substitutes.

- The Journal will accept advertisements for infant-feeds, which are therapeutic in nature, for example lactose free feeds, breast milk fortifiers, hypo-allergic feeds and feeds designed for tube feeding. Any such advertisements shall include a phrase that normally exclusive breast milk feeding is the best food for babies.

- Advertisements must be factual and in good taste.

- Alcoholic beverages, Tobacco products and other substances considered harmful to health may not be advertised in SAJCN.

- There shall be full disclosure at all times of funding sources

- The decision to reject an advertisement / sponsorship rests with the Editorial Board and should be recorded, so that further investigations can be conducted if required

- Non-designated support will be accepted from interested organisations and shall be acknowledged in the Journal

- The allocated editorial space for advertisements should not normally exceed 40% of the total editorial space in any one issue of the Journal; however, the costs of publication of the Journal should always be borne in mind in any one given situation

- The Editor, in consultation with the Editorial Board as appropriate, will be responsible for the final acceptance of any advertorial material
With the start of the New Year, the continuing ravages of changing weather patterns and their adverse potential, and real, consequences on health and nutrition and food security globally, the launch of the International Food Policy Research Institute’s 2016 Global Food Policy Report is a timely addition to the pool of current knowledge. The report is remarkable for, among other issues in its rich content, the poll carried out among agricultural, economic development, and health and nutrition field workers, the majority of whom are in the whole pessimistic about our ability to eliminate hunger and undernutrition by the 2025, and more than half (60%) of whom are not satisfied with current global food policies. With regard to the latter, the report also calls for the creation of “a food system that is more efficient, inclusive, climate-smart, sustainable, nutrition- and health-driven, and business-friendly”, indeed a mammoth task. Equally mammoth is the call to shift people’s diets from the energy rich and animal foods based Western type diets to more sustainable plant foods based diets, a call that is not in itself new, in principle at least.

The transfer of the SAJCN to the Taylor and Francis manuscript management platform (Editorial Manager; editorialmanager.com/sajcn) for the submission of new manuscripts is gaining momentum but its implementation is also associated with regrettable short delays, which are being overcome. The new SAJCN Editorial Board, a separate entity to the SAJCN’s Management Board, has been appointed and will be announced in due course following its first inaugural meeting which is being planned to take place soon. A further point of progress is that manuscripts accepted for publication are being published upon acceptance, weeks and even months before the SAJCN itself is published. There is also a plan to introduce the previously announced “Article Processing Charges” as of June 2017. African authors will be charged R 5 000 and international authors $750 per manuscript. Finally, to confirm, the SAJCN is listed on the list of accredited journals of the Department of Higher Education and Training 2017

References

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Editor-in-Chief: SAJCN
Addressing Undernutrition in Mothers and Children

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Growth is a continuum through intrauterine life, infancy, childhood and adolescence. The effects of nutrition and growth have major effects on childhood morbidity and mortality. Their effects also persist for the remainder of the individual's life and have an important influence on the incidence of so-called adult onset diseases of lifestyle. Factors influencing intrauterine growth are still poorly understood but important evidence-based interventions in this regard have been reported. The major determinant of growth in low and middle-income countries (LMIC) during the first six months of life is exclusive breast-feeding, and more effective and evidence-based interventions to improve breast-feeding rates and duration are urgently needed. The combination of normal intrauterine growth and good growth in the first six months of life, however, does not necessarily ensure that subsequent growth will remain satisfactory.

Large cohort studies from South Africa and other LMIC have shown an increase in the rates of stunting from 6 months to 2 years of age and this is largely related to nutrition over this period, in particular poor complementary feeding and the adverse nutritional effects of intercurrent infections. The adverse effects of mild to moderate undernutrition are often not fully appreciated. A study that analysed data from LMIC countries showed that more than half of all childhood deaths, although not the direct cause of death, were attributed to the potentiating effects of malnutrition. Of these 80% were attributable to mild-moderate undernutrition rather than severe undernutrition.

Complementary feeding, i.e. the feeds given in addition to breast milk or breast milk replacements between the ages of 6 and 24 months, has a major influence on growth over this period. The paper by Mokori in this issue reports on a comparative analysis of secondary data from the Uganda Demographic and Health Surveys conducted in 2006 and then again in 2011 with specific emphasis on complementary feeding. Using the World Health Organization (WHO) definition of a “minimal acceptable diet” (MAD) which they define in their paper, there was a small yet significant increase in 2011 in those 6 to 23 months of age who received a MAD from 23% in 2006 to 26% in 2011. Although this was a welcome finding, it can be seen from these figures that around three-quarters of these children during both time periods did not receive a MAD. In addition, over the two time periods there was an increase in bottle-feeding, and a decline in breast-feeding at 2 years of age from 55% in 2006 to 47% in 2011. The combination of the decline in prolonged breast-feeding and inadequate complementary feeds is likely to be representative of most countries in sub-Saharan Africa and is a major contributor to the high levels of stunting seen.

When the components making up the MAD were analysed further, deworming and having been immunised were positively associated with some of these components. While the authors attribute this to the efforts by the Ugandan government to provide complementary feeding education during visits for these interventions, it should be born in mind that these are associations and not necessarily cause and effect. It may be that those mothers who attended clinics for these interventions were better informed about childcare and nutrition and were possibly more advantaged from a socio-economic point of view resulting in the provision of better complementary feeds. As with all associations, being hypothesis generating, they should be followed by prospective intervention studies.

The importance of providing acceptable complementary feeds and preventing stunting does not only improve, in isolation, childhood survival. Stunted children have been shown to perform less well with regard to secondary school achievement thus limiting their abilities with respect to the job market. Kimani-Murage reported on the so-called double burden of malnutrition in a poor rural South African setting. High levels of stunting amongst young children were seen concomitant with significant levels of overweight and obesity in adolescents and adults, especially women. This is of great relevance with regard to the development of diabetes and other diseases of lifestyle. Eating patterns are often established early on in life, and an acceptable diet in infancy and childhood may lay the basis for good eating habits throughout childhood and beyond.

While good complementary feeding is a key factor in preventing stunting and its consequences, the issue of improving maternal and child nutrition should be seen in a broader perspective, and interventions should be evidence based. Bhutta and Das recently reviewed the evidence currently available. A number of maternal interventions have been shown to have a positive effect on both maternal health and birth weight. These include daily iron supplementation, micronutrient supplementation, balanced protein-energy supplementation, and antimalarial therapy in areas where the malaria incidence is high. All of these have been shown to improve birth weight overall and reduce the incidence of intrauterine growth restriction.
As regards interventions after birth, education and counselling regarding breast-feeding have been shown to improve the rate and duration of exclusive breast-feeding. Vitamin A supplementation and intermittent iron therapy both have a positive effect on overall morbidity and mortality. Recurrent episodes of diarrhoea and lower respiratory infections have an adverse effect on linear growth and preventive zinc supplementation has been shown to reduce the number of such episodes in targeted populations. Similarly, regular hand washing by childcare providers and provision of clean water has an effect on diarrhoea morbidity.

Thus a multipronged approach to maternal and childhood undernutrition is needed. Clearly, not all of the above interventions may be applicable to all settings. It is thus important for each region to evaluate and determine the most appropriate interventions which are applicable in a given setting. However, scaling up a package of interventions including efforts to improve complementary feeding is urgently required to improve undernutrition of mothers and children.

References
Attributes contributing to the development of professionalism as described by dietetics students

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Internationally there is a renewed interest in professionalism and how to cultivate this among students. This study identifies and discusses the main attributes students view as important to develop professionalism. It is postulated that some important additions should be made to ethics programmes in order to enhance professionalism with students.

**Keywords:** attributes, ethics education, healthcare education, professionalism, undergraduate medical students

**Introduction**

Healthcare professionals in most disciplines, including dietetics, are experiencing frustration as changes in the healthcare delivery systems in virtually all industrialised countries threaten the very nature and values of professionalism.1 Changes include (but are not limited to) healthcare delivery patterns (private versus public), technological advances, and challenging initiatives such as quality assurance and evidence-based medicine.2 Often the healthcare profession has been criticised for erosion of professional and ethical values, with fraud reported as the most prevalent.3 In a recent survey in the USA, only 33% of the respondents expressed confidence in the medical system, which lags far behind other institutions, including the military, small business and the police.4 One of the reasons the author gives for this scepticism is the predominant perception that organised healthcare provision has been more focused on protecting its own interests rather than working to advance broader public health goals. The healthcare community has responded to this criticism by an increased interest in conserving, advancing, researching, teaching and evaluating professionalism in both education and practice areas.5

On this issue, a general literature search was conducted to identify the attributes that a healthcare worker should exhibit in order to be deemed professional. According to the Health Professionals Council of South Africa (viz. Booklet 1 – General Ethical Guidelines for healthcare professions), 13 core values of professionalism are described, which include: respect for persons; beneficence; non-malefice; human rights; autonomy; integrity; truthfulness; confidentiality; compassion; tolerance; justice; professional competence and self-improvement; and, community. Mueller consolidates the aforementioned in his research when he identifies key attributes to professionalism, namely: accountability (the healthcare provider (and the profession) takes responsibility for his or her behaviours and actions); altruism (patients’ interests, not healthcare provider’s or the profession’s self-interests, guide behaviours and actions); excellence (the healthcare provider commits to continuous maintenance of knowledge and skills, lifelong learning and the advancement of knowledge); and, humanism (compassion, empathy, integrity and respect).6

Brody and Doukas argue that professionalism can essentially be seen as an implied contract between society and the healthcare profession, in which mutual benefits and expectations are conferred on the other, and which may be renegotiated if circumstances change.6 The notion that a social contract exists can provide a useful frame within which professionalism can be taught, where students can reflect on the ethical importance, and context of adequate self-regulation. Through self-regulation and the development of attributes the student can cultivate and establish the conditions for trustworthiness. Seen against the aforementioned, it would greatly benefit the teaching of professionalism at tertiary level if one could gauge which attributes final year dietetics students’ view as important in the development of professionalism.

It stands to reason that often the concepts of professionalism and ethics are used interchangeably. Although these concepts have similarities in the end result (namely better patient care), they have vastly different underpinnings. Ethics refer to external guidelines which aim at influencing a person’s behaviour by recommending how one ought to behave in a specific context. Professionalism on the other hand refers to skills and competencies (specialised knowledge) an individual must acquire, as a societal expectation, in order to be seen as a professional. For the purpose of this article, the focus will only be on professionalism and the skills attributed to the development thereof in a cohort of students.

**Sample and methodology**

The sampling technique used was a non-probability technique, since the focus of this study was exploratory in nature in order to gain more knowledge on dietetics students’ view of attributes which develop professionalism. The chosen participants were final-year dietetics students. The inclusion criteria were that they needed to have had fieldwork exposure, a clear understanding of English (as the questionnaire was in the said language), and to be in their final year of study. A total of 11 final-year dietetics students participated in this study from the University of the Western Cape. A control group was not included as the aim of this study was not to address any threats to the validity of the data, but rather to elaborate the richness of the group studied and to identify commonalities and differences within the group. The data were collected by virtue of a pen-and-paper questionnaire given to the participants, where they had to rank 12 attributes most cited by literature, and rank these from the most to the least important. This study received ethical clearance (REC/2015/05/006). Participants were not obliged to complete the questionnaire. Anyone could have left the study at any time without experiencing any adverse effects.
From the cohort, 10 participants were female and only 1 was male. The average age distribution was between 21 and 24 years of age.

Results
The aim of this section is to report on the most important attributes the students identified which, according to them, would develop professional behaviour. Below is a frequency distribution which indicates that the six most important attributes were: respect for patients; clinical competence; ethical conduct; altruism by being non-judgmental and compassionate; education to go on regular refresher courses; compliance with the law; cultural competence; and, have good leadership.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respect</td>
<td>21%</td>
</tr>
<tr>
<td>Clinical competence</td>
<td>18%</td>
</tr>
<tr>
<td>Ethical conduct</td>
<td>16%</td>
</tr>
<tr>
<td>Altruism</td>
<td>9%</td>
</tr>
<tr>
<td>Education</td>
<td>8%</td>
</tr>
<tr>
<td>Cultural competence</td>
<td>5%</td>
</tr>
<tr>
<td>Leadership</td>
<td>5%</td>
</tr>
<tr>
<td>Legal</td>
<td>5%</td>
</tr>
<tr>
<td>Accountability</td>
<td>4%</td>
</tr>
<tr>
<td>Interpersonal skills</td>
<td>4%</td>
</tr>
<tr>
<td>Self-reflection</td>
<td>3%</td>
</tr>
<tr>
<td>Appearance</td>
<td>2%</td>
</tr>
</tbody>
</table>

Discussion
Arnold and Stern\(^7\) have proposed a framework for professionalism where they have identified clinical competence, a sound understanding of ethics and effective communication skills as the cornerstones for professional behaviour. The data analysed in this study support the first two assertions of the authors in as much as clinical competence, which focuses on technical skills and diagnostic ability, and the ethics of patient beneficence correspond to their framework. Being a healthcare provider, any dietician requires a sound understanding of ethics. Because of the nature of their work, dieticians inevitably will encounter ethical dilemmas (e.g. requests to breach confidentiality, sharing information with next of kin, applying therapy to those with limited decision-making capacity, etc.); and, they need to have the ability to discern what constitutes ethical behaviour and what does not.\(^8\) Research conducted in South Africa has shown that most dietetics professionals adhere to ethical rules and conduct their duties in a professional manner.\(^9\)

Communication was, however, not as highly regarded by the students as per Arnold and Stern's assertion. A reason for this difference could be the fact that much of their fieldwork experience was under the supervision of a senior, and also possibly because their patients are assigned to them; and, hence, they do not need to be aware of verbal and non-verbal cues to discern patients’ healthcare-related concerns, goals and preferences. Another reason could be that the curricula followed by the specific students do not address the issue of communication skills.

The one attribute identified by all the respondents, though for some to a lesser degree of importance at times but seen as the most important overall, was the fact that one should have respect for his/her patient and treat them with dignity. This attribute is in line with the core competency as set out by the influential Romanell Report on Graduate Medical Education\(^10\) and the HPCSA.\(^11\) What is worrisome of these results, however, is that a core competency identified by the aforementioned reports, namely cultural competence, was rated very low by the students at large. The fact that they do not view professionalism as being important in cultural diverse settings when dealing with people from different groups could possibly be a red flag.

Cross-cultural differences regarding therapy and treatment often enlarge the disagreement between the views held by patients and healthcare providers. The latter often exhibit an inability to recognise and deal with perspectives of illness that deviate from those of their biomedical training. This may then result in restricted and/or inappropriate attempts to identify problems and develop plans to solve those issues. Cultural boundaries can therefore make the patient feel that he/she is not respected and treated professionally. Often formal training, instruction and certification in methodology create a sense of correctness, authority and superiority amongst healthcare professionals in which ‘the professional’ knows best. This can lead to a situation in which patient views are overlooked or excluded as invalid concerns. Failure to recognise a patient’s views and role in the illness process can severely hamper the patient-professional relationship and should be addressed in any training programme for graduates.

Another point of concern is that the attribute of self-reflection was rated as one of the least important by the students. This attribute, which was described in the questionnaire as the ability to admit to one’s own mistakes and being aware of one’s own biases, was seen as important by only 3%. There was a correlation between this attribute and cultural competence. Nortjé and Hoffmann hold that in order for healthcare professionals to choose the right thing to do, they need to have the ability to think critically about a situation and apply this to their decision-making model.\(^12\) What is of great interest in the data was that appearance (clothing and general tidiness) was least important in cultivating professionalism among students. The question could be raised whether the general change in socially acceptable attire has also influenced students’ perceptions that the feathers do not make the bird\(^13\) and that their clothing should be seen as who they are individually. The reality is that a healthcare provider can meet patients from a vast array of social and cultural groups any day. Inappropriate attire could inhibit a professional relationship; for example, leisurewear could portray an image of inexperience and non-seriousness.

Strengths and limitations
The strengths of this study were the importance of the opinions of students’ experiences, the occurrence of similar opinions for participants in this study, and future research possibilities highlighted by the study. Limitations of this study were limited generalisation of the results and geographical representation of the participants, since the research was conducted in the Western Cape at a single university only. Another limitation to the study is the fact that a small cohort participated voluntarily in the study.

Conclusion and recommendations
Taking cognisance of the data above, the question could be asked how one could promote the importance of appropriate attributes to enhance professionalism. Developing curricula to address this issue could be an option, although some hold that it is never easy to teach professionalism.\(^14\) One reason for this difficulty is alluded to by Spencer\(^15\) who argues that despite the
urgings of senior academics and the pressure of public expectations, inserting professionalism and teamwork into the curriculum is proving to be challenging. The main reason for this is that traditionally, professional values and behaviours have been believed to be ‘caught’ from rolemodels. Although one cannot negate the influence that seniors (lecturers and clinical supervisors) have on a student’s view of professionalism, this informal process is no longer considered sufficient with the current heterogeneity of medical students from different social, cultural and socioeconomic backgrounds. 

In order to circumvent alienation of students from different cultures, it is paramount that professionalism must be explicitly taught in the formal curriculum. Taking cognisance of the fact that the definition of professionalism is influenced by cultural values, lectures on what one ought to and ought not to do would be counterproductive. A pedagogical approach which is suggested for teaching professionalism is that of ‘situated learning theory’, where knowledge needs to be presented in authentic contexts. This can be very positive to enhance professionalism in the classroom. The theory holds that information/knowledge should be presented to the students in an authentic context with which they identify. Talking about professionalism in the abstract form would not necessarily influence behavioural changes. Using the Socratic debate premise (in a safe environment), where the value of any question is not necessarily its answer, but lies in asking the questions and reflecting on them, would also be greatly beneficial. Therefore, a set of scenarios (or vignettes) describing professional and ethical dilemmas relevant to the students’ lived experiences, self-reflection and reflection among peers, will be fundamental to the understanding and development of professionalism.

References


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You can obtain 4 CEUs (ETHICS) for reading the article: “ATTRIBUTES CONTRIBUTING TO THE DEVELOPMENT OF PROFESSIONALISM AS DESCRIBED BY DIETETICS STUDENTS” and answering the accompanying questions. This article has been accredited for CEUs for dietitians. Ref number: DT/A01/P00008/2017/00001

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7) Click on “Review/Answer Questions”.
8) Choose the correct option or options and then click on “Next”.
9) Click on “Submit Answers” to obtain your results. We regret that only online questionnaires will be accepted.

1) True or false: Professionalism is the same as ethics.
   a) True  b) False

2) What is seen as a positive outcome of clinical competence?
   a) Making budget  b) Effectiveness  c) Transparency  d) Understanding ethics

3) What is the primary focus of healthcare?
   a) Mutual benefits and expectations  b) Research  c) Evidence based medicine  d) Economic sustainability

4) True or false: There is a need to train healthcare students in the tenets of professionalism.
   a) True  b) False

5) Changes in healthcare which necessitates a focus on professionalism include:
   a) Research  b) Delivery patterns  c) Billing practices  d) Human rights

6) Core values as described by HPCSA include:
   a) Respect  b) Accountability  c) Integrity  d) All of the above

7) True or false: The attribute of self-reflection was rated as one of the most important by the students in this study.
   a) True  b) False

8) The healthcare community has responded to enhancing professionalism through:
   a) Enforcing their Codes of ethics  b) Teaching  c) Better marketing  d) All of the above

9) True or false: Appearance (clothing and general tidiness) was considered least important in cultivating professionalism among students in this study.
   a) True  b) False

10) True or false: In a recent study in the USA the respondents had more confidence in the police than in healthcare providers.
    a) True  b) False

11) Cross-cultural differences refer to:
    a) Not trusting the dominant culture’s medical model  b) Being of a different culture than the patient  c) Different views held by patients  d) Different mother tongues

12) True or false: Most dietetics professionals in South Africa do not adhere to ethical guidelines.
    a) True  b) False

13) True or false: Treating one’s patients with respect implicates treating them with dignity?
    a) True  b) False

14) Clinical competency refers to:
    a) Technical skills only  b) Diagnostic ability only  c) Technical skill and diagnostic ability  d) None of the above

15) True or false: Thinking critically about a situation is of paramount importance in being able to choose the right from the wrong.
    a) True  b) False

16) True or false: Feathers make the bird, in the sense of appropriate attire contributing to a professional perspective from patients.
    a) True  b) False

17) When should patients’ views in relation to the illness process be addressed?
    a) It is recommended that the student help the patient understand their patient rights.
    b) It is recommended that the student help the patient understand their human rights.
    c) It is recommended that this should be included in graduate training of students.

18) Why is the role-model argument not such a great influence on students’ formation of professionalism anymore?
    a) Students have become more political  b) Gender differences which may occur  c) The age gap which exists between students and lecturers  d) Differences in socio- and cultural backgrounds

19) Professionalism among students can be developed by:
    a) Involving students in a Socratic debate  b) Teaching students about HPCSA’s code of ethics  c) By focusing on Aristotelian virtue ethics  d) Propagating Bentham’s philosophy of Hedonism

20) Altruism in this study has been defined as:
    a) Being ethical  b) Having good leadership skills  c) Respecting patients  d) None of the above

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Challenges to implementing the food-based dietary guidelines in the South African primary school curriculum: a qualitative study exploring the perceptions of principals and curriculum advisors

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Objectives: The South African food-based dietary guidelines (FBDG) were developed and implemented to promote healthy lifestyles in the population along with preventing non-communicable diseases and other forms of diet-related illness. The FBDG were recommended for implementation within the national school curriculum. The objective of this study was to explore perceived challenges to successful implementation of these guidelines in the primary school curriculum.

Design: This qualitative study gathered data via semi-structured individual interviews. Data were transcribed and analysed with ATLAS.ti software, using a thematic approach.

Setting: Public primary schools located in three education districts in the Western Cape, South Africa.

Subjects: Principals at twelve schools from communities with different socioeconomic statuses, and five curriculum advisors of relevant subjects from provincial and district levels.

Outcomes measures: Perceived barriers to implementing FBDG in the primary school curriculum.

Results: A lack of knowledge and/or expertise related to the FBDG by educators, time constraints within the teaching programme and lifestyle related factors of educators, parents and learners emerged as the three main challenge themes from the interviews. A lack of resources was identified as an additional theme.

Conclusions: The principals and curriculum advisors anticipated many barriers to the success of implementing nutrition education using the FBDG in the primary school curriculum. Adequately addressing such barriers through improved awareness and knowledge of the FBDG by school staff could improve the potential of using the FBDG as a nutrition education tool in primary schools in South Africa.

Keywords: challenges, food-based dietary guidelines, implementation, school curriculum, South Africa

Introduction

Healthy diets and regular physical activity are key factors in attaining and maintaining good health throughout the life cycle. In contrast, unhealthy diets and physical inactivity along with high blood pressure, raised blood glucose, abnormal blood lipids, and overweight or obesity are major risk factors for non-communicable diseases (NCD) such as type 2 diabetes mellitus, cardiovascular disease, renal failure, and certain cancers.1

South Africa, like many other developing nations, is undergoing a nutrition transition and faces the double burden of undernutrition and undernutrition. Overweight and obesity in both adults and children are among the main NCD risk factors emerging in many South African settings.2 Regarding under-nutrition, 16% of children aged 0–9 years were identified with stunting, while 5.4% were found to be underweight in the first South African National Health and Nutrition Examination Survey (SANHANES-1).3 The dual existence of undernutrition and overweight in the same population and household is mainly attributed to food insecurity, poor diets and physical inactivity.4 Therefore, improving lifestyle behaviours is of importance.

In response to the burden of disease, the South African government has implemented several strategies, including the National School Nutrition Program (NSNP)5 and the Food-Based Dietary Guidelines (FBDG). The guidelines were envisaged for use as an education tool to inform, educate and empower South Africans to adopt healthy diets and change their dietary behaviour.6 The Department of Health (DoH) and academic institutions anticipated the FBDG to form the basis of nutrition education in schools in South Africa.7,8 Furthermore, nutrition education is one of the key pillars of the NSNP (now one of the flagship programmes of the National Department of Basic Education [DBE]) and, as such, must be reinforced in the curriculum in accordance to the DBE.9 It is, however, not clear to what extent schools implement this important component of the NSNP.

The utilisation of educators and the school curriculum are recommended globally as a key strategy in communicating the FBDG to schools being seen as an ideal setting for implementing nutrition programmes and services.9 In South Africa, since the development of the FBDG, several school-based initiatives have used these guidelines to develop nutrition education materials to complement the national curriculum on nutrition.10 However, these programmes were only experimental and very few educators indicated that they use these materials to teach nutrition at schools.11

At the time of the study, the national school curriculum in South Africa included nutrition and healthy lifestyles in the subject, Life
Orientation (LO). The outcome-based curriculum allowed educators to select their own teaching materials to reach the outcome assessment standards. This curriculum has subsequently been revised and the name ‘LO’ has been changed to ‘Life Skills’ with the aim ‘to be more specific on what is to be taught and learnt.’ Although, the new curriculum includes FBDG in grade five as part of ‘Health and Environmental Responsibility’, the time-frame allocated for nutrition is three hours per annum. Although this time allocation is far less than the minimum 50 hours recommended by school nutrition researchers, nutrition information is also provided in other subjects such as Natural Sciences (seven hours in grade six), providing the opportunity for concepts contained in the FBDG to be reinforced across subjects. Additional concerns include LO (now Life Skills) that is often taught by educators who are not specialised in the subject and who also have poor knowledge on nutrition.

Despite nutrition education being part of the school curriculum in South Africa, research in school settings revealed that learners or pupils preferred unhealthy food choices. There were also gaps in their knowledge about nutrition and healthy lifestyles. Although researchers have attempted to understand the extent to which educators succeeded in achieving the LO curriculum outcomes, no specific attention was paid to nutrition and healthy lifestyle topics.

The 2012 Integrated School Health Policy (ISHP) incorporated the FBDG as the nutrition education component of a school-health programme. Health education and nutrition, particularly FBDG, could be provided to learners (pupils) through Life Skills in the national curriculum or as additional co-curricular/school-based activities or programmes. The ISHP targets all school-going children and youth from grade R (at age six) to grade 12 (at age 18). The ISHP comprises health screening, on-site service and health education, and is designed to meet different stages of developmental and health needs in various schools and communities.

Subject curriculum advisors at provincial and district levels, along with principals, are supportive channels in the curriculum implementation process, while educators directly influence curriculum outcomes. The opinions of these role-payers could provide invaluable insights into the success of a new or amended curriculum in public schools. Understanding their concerns could furthermore contribute towards knowing what support is required for implementing FBDG in schools. Accordingly, we conducted a study to explore perceptions among educators, principals and curriculum advisors on the feasibility of optimising the implementation of the FBDG in the primary school curriculum. This paper illustrates their perceptions on potential barriers that could hinder teaching the FBDG in primary schools.

Materials and methods

Study design

This qualitative study was part of a cross-sectional and descriptive study using quantitative and qualitative methods. The quantitative component of the study reporting on data collected from educators at 12 public primary schools from different socioeconomic strata has been published elsewhere. This paper focuses on the qualitative arm of the study comprising of interviews with principals at these schools and selected curriculum advisors.

Sampling methods

Data for the qualitative arm were collected from 12 (out of 418) randomly selected public primary schools located in three of eight education districts in the Western Cape representing urban, peri-urban, and rural areas, as well as all three languages used as a medium of instruction in the province (English, Afrikaans and Xhosa).

Subject curriculum advisors were selected based on findings from the quantitative arm of the study. The ‘general education and training band’ (grades R to nine) in the national curriculum include eight subjects: Languages, Mathematics, Natural Sciences (NS), Technology, Social Sciences, Arts and Culture, LO, and Economic and Management Sciences (EMS). The educator survey identified LO, NS, Mathematics, Languages and EMS as possible subjects for integrating and teaching FBDG. Advisors for Mathematics and Languages were excluded from the investigation, as they were not available at data collection. Twelve principals (five each from high and low-income and two from middle-income schools) and five curriculum advisors comprising three at provincial level with one for each subject (LO, NS and EMS) and two for LO at district level, participated in the interview sessions.

The Research Ethics Committee of the University of Cape Town approved this study (HREC.REF: 498/2010) and the Western Cape Education Department gave permission for this study to be conducted at schools. Participants were informed about the objectives, procedures and confidentiality aspects of the study and provided written consent.

Data collection

Data were collected using a semi-structured interview schedule. The schedule included ten open-ended questions, with the aim to elicit perceptions of the principals and curriculum advisors on the feasibility of implementing FBDG in the school curriculum. The questions addressed participants’ concerns about learners’ health, explored what is taught about nutrition and healthy dietary habits in the primary school curriculum, feasibility of and barriers to implementing FBDG, and recommendations towards implementing FBDG into the primary school curriculum.

Experts in the development of FBDG and primary school-based interventions were involved in the development of the interview schedule questionnaire, which was piloted among two principals not participating in the study. Except for the inclusion of recommendations’ section, very little modification was needed after the pilot. Although the interviews were guided by predetermined questions, the interviewer still allowed the conversations to flow naturally.

The interviews were conducted individually at the participants’ respective offices. The same interviewer conducted all interviews, which lasted approximately an hour each. All communications were done in English as preferred by the participants, and audiotaped. A full set of the FBDG of the DoH were disseminated to the principals and curriculum advisors via e-mail before the scheduled interviews.

Data analysis

All the records were transcribed verbatim by the interviewer and transcripts were checked for accuracy by another experienced researcher. This researcher also guided and confirmed the analysis process, as well as the results. The ATLAS.ti v5.2 software package was used for coding and managing the data, resulting in specific themes representing each objective of the study. In this study, data were analysed as a whole (principals and curriculum advisors together), and only the most significant data that emerged from the analysis relating to the barriers to implementation of the FBDG in the national curriculum or as curriculum activity are presented in this article.
Results
Except for one, all principals were male. Their mean age was 55 years (SD 4.4). Their experience included a mean of 12 years (SD 6.2) as principal and 32 years (SD 5.4) as educators, and two of them had taught LO. The sizes of the schools ranged from 484 to 1752 learners per school, with between 35 and 46 learners per class. Three of the curriculum advisors were responsible for LO and one each for NS and EMS. Two of them were female and three were male, and their mean age was 51 years (SD 5.4). Their experience as curriculum advisors was a mean of 11 years (SD 7), and as educators was 19 years (SD 5.6).

The findings of the study showed that participants, i.e. principals and curriculum advisors, identified two sets of challenges: barriers specific to implementing the FBDG as additional curricular or non-curricular activities for nutrition education at schools, and more general challenges that could be encountered if it were included as envisaged in the education programme at schools. These challenges, however, overlapped and were often interlinked. Table 1 presents the main and sub-themes that emerged as barriers to implementing the FBDG at the selected schools as an add-on to the curriculum, as well as the more general concerns raised by participants.

From Table 1, it is clear that potential challenges identified by participants centred on three main themes: (1) lack of expertise/knowledge; (2) time constraints; and, (3) lifestyle and related issues. Various sub-themes were identified in each main theme and, as can be seen from the table, challenges mostly concerned the educators. A lack of resources in the implementation of the FBDG in schools was identified as a challenge to a lesser extent.

Lack of expertise/knowledge: As can be seen in Table 1, some participants pointed out that a lack of awareness about the FBDG could mean that no perceived need for proper inclusion of the FBDG in the curriculum or otherwise existed among educators. However, even if educators were aware of the FBDG, participants perceived educators as lacking content knowledge about the FBDG. A curriculum advisor suggested that if it were left to educators to include additional resources in the primary school curriculum, they would have difficulty in deciding what to include for which grades, and how to link these with subjects other than LO. Several participants pointed to the challenge of frequent turnover of staff teaching the LO curriculum leading to a potential challenge for conveying the messages of the FBDG in a continuous manner. Parents’ poor knowledge of what healthy dietary behaviour entails was also mentioned as a possible barrier to teaching the FBDG to learners.

Time constraints: Concerning time constraints, various participants pointed out that educators tend to have heavy administrative workloads and that the basic requirements of the curriculum take up all their available time. Participants thought that educators would probably be reluctant if they were requested to teach the FBDG as a supplement or an add on to the curriculum. The time to train educators is also limited since training workshops could only take place after school hours and, if not compulsory (as would be for an extra-curricular offering), educators often refused to attend. Limited time is furthermore available in the structured curriculum for nutrition education.

Lifestyle and related constraints: Three sub-themes emerged regarding lifestyle related factors: Some participants pointed out that educators’ unhealthy lifestyles and overweight status could influence their confidence making them feel uncomfortable during class lessons, and influence lesson content. Participants thought that learners should not only learn the FBDG at school, but also implement these at home. Parents’ poor dietary behaviours could therefore also compromise effective teaching of the FBDG. The most important subtheme regarding lifestyle related factors raised by many participants were, however, the poverty stricken backgrounds of many learners attending the schools in lower socioeconomic areas. Participants mentioned that learners in these schools often come from large poor families where food is not always available, let alone the option for healthy food choices. Some participants perceived teaching the FBDG as problematic as they saw it as teaching the learners to eat what they could not afford.

Lack of resources: Participants also identified financial constraints as an important perceived challenge to implementing the FBDG. Concern was expressed whether the Department of Education (DoE) and individual schools had sufficient financial resources to fund such a programme. One curriculum advisor pointed out that to direct educators to a website was inappropriate, the relevant resources would have to be provided in hard copy, which would require sufficient funding.

Discussion
Overall, these results illustrate some of the key challenges to successfully implementing the FBDG as a programme in schools or as the national primary school curriculum, as perceived by selected principals and curriculum advisors in a large metropolitan area of the Western Cape province of South Africa. A lack of knowledge and/or expertise related to the FBDG by educators, time constraints within the teaching programme and lifestyle and related factors of educators, parents and learners emerged as the three main themes from the interviews. A lack of resources was identified as an additional theme.

Knowledge: The perception of principals and curriculum advisors that many educators are not aware of the FBDG is supported by the educators’ survey reporting that only 28% of educators knew about the guidelines.23 Similar findings were reported from studies conducted elsewhere in South Africa.24 There is no clarity in the literature on the level of awareness regarding FBDG in the general population of countries that have implemented such guidelines. According to Hawkes,25 evidence from a small number of countries suggests that consumers are aware of the FBDG where they exist, but this does not mean that they understand them. The author, furthermore, states that very few studies specifically measured actual use of the FBDG by consumers and uses South Africa as an example where FBDG are promoted to the public via written/electronic information through health and/or education sector channels. Our study, however, suggests that these promotion efforts have not been successful at least for the educators that participated in our survey. The lack of awareness of the FBDG together with a lack of nutrition knowledge could pose a challenge for the effective teaching of the FBDG. This challenge would be exacerbated by a lack of LO specialist educators and a high turnover in staff teaching LO. Similar factors were identified in a study that investigated the perceptions of LO educators in schools in the Western Cape.12 Teaching a learning area in which they had not been trained was also reported as a serious stressor for Life Science educators at secondary schools in South Africa.26 Likewise, international studies revealed educators often had a lack of confidence in implementing the topics in which they did not have sufficient knowledge.27 This could result in negative attitudes and less time spent on the topics in the classroom.28
This perceived lack of knowledge is especially disconcerting when considering that one of the most important programmes of the DBE, the NSNP, has nutrition education and support of nutrition content in the total curriculum, and not only Life Skills, as one of its main objectives.

**Time constraints:** Educators’ workload, the requirements of the present curriculum, reluctance to add to these, and limited time available for professional development of educators emerged as time-related constraints to teaching the FBDG. These perceptions are consistent with findings from other research studies in South Africa where researchers reported that educators’ workload constrained preparation, planning and presentation of LO class lessons.18,20

Table 1: The main and sub-themes that emerged as barriers to implementing the FBDG

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subtheme</th>
<th>Supporting quotes</th>
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<tbody>
<tr>
<td>Educators: not aware of the FBDG</td>
<td></td>
<td>“These things are basically in the curriculum and unfortunately I cannot say there is a demand. Because most educators will not have been aware of the FBDG. I wasn’t aware that this has been around since 2004. 2005 – I wasn’t aware of that... What you don’t know you won’t ask for. They don’t give them that voice to say we think we need more content here or where we could put in the FBDG – which they weren’t aware of.” (A2, LO)</td>
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<tr>
<td>Educators: lack of content knowledge</td>
<td></td>
<td>“Bear in mind that in our GET [General Education Training] band many of our schools we do not have specialists in the subjects. We have got educators who are generalists in those grades. So they will teach what they know or they will focus on what they know compared to what they do not know. Yes, so that is some of our dilemmas with the curriculum” (A3, NS)</td>
</tr>
<tr>
<td>Educators: turnover in staff teaching the LO learning area</td>
<td></td>
<td>“We have a massive turnover of educators in Life Orientation that teach those things. This year I’m teaching it, next year I’m not teaching it again. The principal will give that Life Orientation to somebody else and it is just sometimes that kind of turnover of educators within the staff that will make it difficult to impart the very important information to learners on a continuous basis. That learners can understand and realize and benefit from the curriculum – they don’t. They don’t. At the moment I’m not happy with that.” (A1, LO)</td>
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<tr>
<td>Parents: Lack of nutrition knowledge</td>
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<td>“Sometimes when you teach the children they have the perception that these things that we are telling them about – lentils and what not. Some of their parents, they don’t know about these things” (P7, low-income school)</td>
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<tr>
<td>Educators: Work load</td>
<td></td>
<td>“They stress, because of all the administration and the burden from Head Office and the pressure I put on them and the pressure I get, the whole system is tasks.” (P8, high-income school)</td>
</tr>
<tr>
<td>Educators: Requirements of the curriculum</td>
<td></td>
<td>“… [You] can’t do anything because this thing – this policy document they want us to follow that slavishly at most, for the minimum work. You can do more, but it must be all related to the documents. So when you do more you’ll have to need more time, and that is normally the problem that very seldom do they consult the educators or us.” (A2, LO)</td>
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<tr>
<td>Educators: Reluctance to add to the curriculum</td>
<td></td>
<td>“I think most of educators, knowing schools, knowing educators; unfortunately, I am in education for 34 years. I know! That is, if it’s not being set, it’s not going to be done. If it’s not stated formally by the Department, it’s not going to be done. Because educators tend to focus only on the basic things need to be done within the curriculum of that learning area” (P9, middle-income school)</td>
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<td>Educators: Limited time available for training</td>
<td></td>
<td>“Another barrier could obviously be if the Department gives us a chance to have workshops with the educators just to enlighten them. They will say we can arrange on our own, but then it’s you know – we can’t start earlier than three o’clock... Educators are tired. So you don’t have a long time to fit in basically a grade one to grade seven workshop. So that could be a barrier for implementation... The workshop is there to make it easier for me to get to them, but as I said now many don’t turn up, because I cannot make the workshop compulsory.” (A2, LO)</td>
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<td>Educators: Weight status and eating behaviours</td>
<td></td>
<td>“Obesity it’s a huge problem in many of our settings. How do you teach learners to be aware of the problem of obesity and you yourself find it difficult? You can’t explain it to young people. So those are the immense dilemmas that our educators in Life Orientation find themselves in.” (A1, LO)</td>
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<tr>
<td>Parents: Eating behaviours</td>
<td></td>
<td>“… you need your role models; you need your healthy foods at home as well. And we’re not sure whether that happens all the time. I mean just think of when people refer to food nowadays, they refer to pizza, to fried chicken, to a lot of prepared food or processed food already. So the chances that what they are taught in school and what happens at home, there can be a vast difference.” (A5, LO)</td>
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<td>Learners: Disadvantaged background</td>
<td></td>
<td>“It is one thing to teach all this, but it’s another thing for pupils, say in our specific circumstances to get back and, with their parents, implement it, you know. Because we living, in a certain area that is rural and with lots of parents, say about 80% that are quite poor and haven’t the means or the finance to buy on a regular basis, say what is needed for them to be actually very healthy and so on. So that’s the one concern and the one problem. So we can teach in the school but it’s another thing to get the parents to feed them on that way also.” (P10, low-income school)</td>
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<tr>
<td>Lack of resources</td>
<td>Financial constraints and lack of resources</td>
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</table>

Similar to what was reported by curriculum advisors in this study, Villegas-Reimers21 in a review on the professional development of educators pointed out that the increased demands for school accountability and testing learners could limit time for professional development outside the core curriculum. These authors suggest that it is important to find ways to embed health education in professional development for core curriculum subjects such as reading and writing. This could assist in helping educators to overcome their resistance to add to what is expected in the curriculum. Locally the inclusion of nutrition education and especially the FBDG in the curriculum of educators’ teaching programmes could lay a solid foundation for such professional development activities.
Lifestyle and related constraints: Another important factor which participants highlighted was the high level of household food insecurity experienced by learners and their parents. It has been suggested that a healthy school environment, with educators acting as role models for healthy diets and lifestyle, is needed to reinforce messages contributing to optimal nutrition education. Participants in the present study were concerned that the weight status and unhealthy lifestyles of some of the educators, could influence their confidence in teaching healthy habits and impact on what is taught to learners. Very little research, however, has addressed the association between educators’ own health behaviours and how it may influence their effectiveness as educators and healthy lifestyle role models for children. While it has been suggested that the role of schools and educators as instruments for public health policy should be further investigated, educators’ own health status and health risk behaviours should not deter them from teaching the FBDG through the formal curriculum.

Teaching theory of nutrition and healthy dietary habits, especially the FBDG, to learners from food-insecure families with little chance for informed choices could be problematic according to participants. Schönfeldt and colleagues pointed out that even when the most basic and low-cost food items are selected when applying the FBDG, the associated costs are well beyond the reach of disadvantaged households. With 58% of children in South Africa reportedly living below the poverty line in 2011, the concerns of participants in this study should form part of the discourse around the implementation of the FBDG. The National Schools Nutrition Programme (NSNP) and the Child Support Grant (CSG) have, however, been put in place to address some of these concerns. The NSNP feeds nearly nine million children daily, while the CSG is the single largest programme for alleviating child poverty in South Africa. These measures could possibly contribute to ensuring that the disadvantaged backgrounds of learners would not prevent them from being taught the FBDG.

Research shows that lack of resources has often been a problem in health interventions for developing countries. Most principals and curriculum advisors perceived that the Western Cape Education Department did not have the financial resources to fund a FBDG programme in their schools or implement this appropriately as part of the formal curriculum. Materials for educators and learners and budgets for workshops were some of the resources lacking in schools.

Limitations of this study are the relatively small sample in a single province, which makes it difficult to generalise the results to the broader population. Therefore, results of this study need to be viewed with caution. However, the participants are working with the national curriculum, and the South African FBDG are country-specific, these findings therefore may provide useful information on implementation on a wider scale.

Implications for research and practice
This study has set the agenda for further research needed to strengthen the implementation of the FBDG at schools. Although the revised ISHP has firmly advocated FBDG education in the school environment and curriculum, the curriculum implementers anticipated many challenges to proper implementation. Many of these perceived barriers could be mitigated by creating awareness and increase knowledge of the FBDG and its place in the curriculum by educators across all subjects. Such a large-scale nutrition education effort will have to be spearheaded by the Department of Health in close collaboration with the DBE and National Treasury as adequate financial resources will have to be made available. Exposing all educators to the FBDG could assist in ensuring that nutrition education is implemented in schools as envisaged by the ISHP and the NSNP. It will furthermore optimise the role of the FBDG as the benchmark against which nutrition related content in the curriculum is selected and evaluated. Convincing policy makers of the public health value of such a large-scale effort will ask for determined and informed advocacy from public health nutritionists.

References
12. Van Deventer KJ. Perspectives of teachers on the implementation of life orientation in Grades R–11 from selected Western Cape schools. SAJE. 2009;29:127–45.
These findings therefore may provide useful information fund a FBDG programme in their schools or implement this Education Department did not have the financial resources to health interventions for developing countries. Most principals Research shows that lack of resources has often been a problem taught the FBDG.

possibly contribute to ensuring that the disadvantaged of these concerns. The NSNP feeds nearly nine million children South Africa reportedly living below the poverty line in 2011,33 reach of disadvantaged households. With 58% of children in applying the FBDG, the associated costs are well beyond the teaching theory of nutrition and healthy dietary habits, especially through the formal curriculum. Such a large-scale nutrition education effort will have implications for research and practice.

Challenges to implementing the food-based dietary guidelines in the South African primary school curriculum determined and informed advocacy from public health as the benchmark against which nutrition related content in the curriculum is selected and evaluated. Convincing policy makers and the NSNP . It will furthermore optimise the role of the FBDG to be spearheaded by the Department of Health in close.

References


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1) In response to the double burden of disease, the South African government has implemented the Food Based Dietary Guidelines (FBDG) to:
   a) Ensure food security for all
   b) Encourage South Africans to adopt healthy diets and change their dietary behavior
   c) Provide guidelines for teaching nutrition in the school curriculum

2) The FBDG is included in the Life Skills curriculum as part of:
   a) Health and Environmental Responsibility
   b) Natural Sciences
   c) Nutrition

3) School nutrition researchers recommend that the following number of hours be allocated for nutrition education in schools per annum:
   a) 3 hours
   b) 17 hours
   c) 50 hours

4) The quality of nutrition education delivered in primary schools may be hampered by:
   a) A lack of specialization in the Life Skills subject
   b) A lack of text books
   c) A lack of interest in nutrition

5) The Integrated School Health Policy (ISHP):
   a) Has nutrition as one of its main focus areas
   b) Is designed to meet different stages of developmental and health needs in various schools and communities
   c) Is widely implemented in all schools and provinces

6) It is important to consider the perceptions of curriculum advisors when studying the inclusion of nutrition in the curriculum because:
   a) They directly influence what is in the curriculum
   b) They play supportive roles in the implementation of the curriculum
   c) They know more about nutrition than the educators

7) Principals and curriculum advisors identified two sets of challenges to implementing the FBDG in schools:
   a) These challenges were clearly defined as representing two separate sets of barriers
   b) These challenges overlapped and were often interlinked
   c) The challenges had mostly to do with the content of the Life Skills curriculum

8) The perceptions expressed by principals and curriculum advisors about existing challenges to the implementation of the FBDG in the curriculum mostly concerned:
   a) Educators
   b) The curriculum
   c) The school environment

9) Expecting educators to include the FBDG in everyday teaching may:
   a) Contribute to better nutrition education at schools
   b) Be difficult because of a lack of knowledge of the FBDG
   c) Be expected from all educators

10) Potential challenges for implementing the FBDG identified by participants centred on the following main themes:
    a) Lack of expertise/knowledge, time constraints, lifestyle and related issues
    b) Lack of expertise/knowledge, time constraints and lack of resources
    c) Lack of expertise/knowledge, limitations in the curriculum as well as lifestyle and related issues

11) Participants thought that lack of awareness concerning the FBDG could have the implication that:
    a) Educators would need to know more about the guidelines
    b) No perceived need for the inclusion of the FBDG in the curriculum or otherwise existed among educators
    c) Educators would appreciate receiving FBDG education

12) Principals and Curriculum Advisors pointed out that educators tend to have heavy administrative workloads:
    a) Educators will find time to add teaching the FBDG to their teaching schedule
    b) The curriculum is flexible enough to accommodate inclusion of the FBDG
    c) Educators will be reluctant to teach the FBDG as an additional programme or add-on to the curriculum

13) Some participants pointed out that educators’ unhealthy lifestyles and overweight status could make them feel inadequate to teach the FBDG because:
    a) They would not feel confident about doing so
    b) They would not believe that the FBDGs are important
    c) They would think it is not part of what is expected from them as educators

14) Some participants in this study expressed concern about the feasibility of teaching the FBDG as:
    a) It would teach learners dietary behaviours that they would not be able to afford
    b) Learners would not be able to change their present lifestyle and eating behaviour
    c) Learners are not interested in nutrition

15) Participants expressed the need for FBDG-related material to be made available:
    a) On a website
    b) As printed material
    c) In any format

16) Research on the level of awareness of FBDG in the general population of countries that have implemented such guidelines shows:
    a) It is not clear to what extent the general population is aware of the guidelines.
    b) A high level of awareness about the FBDGs
    c) A moderate level of awareness about the FBDGs

17) It seems important that educators’ knowledge about the FBDG be improved. Some authors have suggested that because time available for professional development of educators is limited, it is:
    a) Important to ensure that health education is presented in a clear and unambiguous format
    b) Important to find ways to embed health education in professional development for core curriculum subjects, such as reading and writing
    c) Clear that educators should not be expected to be health promoters

18) It is often assumed that it is important that educators have healthy lifestyles because they serve as healthy lifestyle role models for learners:
    a) Very little research, however, has addressed this association
    b) It is clear from the literature that educators’ dietary and physical activity behaviours influence those of their pupils
    c) It should be expected from educators to practice good diet and physical activity behaviours notwithstanding their potential to serve as role models for learners

19) In 2011, it was reported that 56% of children in South Africa live below the poverty line. This should concern those who are interested in the implementation and teaching of the FBDGs:
    a) Government is not doing enough to address this problem
    b) The National Schools Nutrition Programme (NSNP) and the Child Support Grant (CSG) have been put in place to address some of these concerns
    c) Implementation of the FBDGs is severely hampered by the poor socio-economic status of many children and cannot be implemented and taught under such conditions

20) Research regarding the FBDGs and the school curriculum conducted in a single South African province could still make a contribution to scientific knowledge because:
    a) The school curriculum is a National Curriculum
    b) All provinces have the same educational system
    c) Schools from various provinces and geographical areas do not differ so much
The magnitude and determinants of anaemia among refugee preschool children from the Kebribeyah refugee camp, Somali region, Ethiopia

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Background: Anaemia is a global public health problem affecting children from both industrialised and developing countries with major consequences for health, social and economic development. Although the burden of anaemia is high among refugee children due to their living conditions, its determinants are not yet clearly identified and documented in Ethiopia.

Methodology: A cross-sectional study with an analytic component was conducted in the Kebribeyah refugee camp during March 2010. A total of 399 refugee children aged between 6 and 59 months were randomly selected and assessed for anaemia status using HemoCue® devices.

Results: The prevalence of anaemia was 52.4%. Most of the anaemic children, 36.6%, were classified as having moderate (Hb 7–9.9 gm/dL), followed by severe, 10.5%, (Hb < 7 gm/dL) while the remaining 5.3% had mild anaemia (Hb 10–10.9 gm/dL). The age of the child, paternal educational level, number of children younger than five years of age in the household, sharing/selling part of ration, inadequacy of ration stock, presence of diarrhoea, personal hygiene of the child, stunting and underweight were significantly associated with anaemia.

Conclusion: The purpose of this study was to demonstrate that anaemia is a severe public health problem among young refugee children and to document its major predisposing factors. In the Kebribeyah refugee camp, these included inadequate food rations, insufficient micronutrient composition, lack of provision of non-food items, selling and sharing of food rations, poor environmental sanitation, poor housing conditions, lack of nutrition/health education and disease (diarrhoea). A comprehensive nutrition service together with a holistic public health-focused approach to empower refugees to prevent the onset of anaemia by engaging in homestead small-scale food production for income generation and improving the integration and collaboration between beneficiaries, food donors and humanitarian aid organisations would be crucial in addressing the consequences of anaemia in the Kebribeyah refugee camp.

Keywords: anaemia, determinants, Ethiopia, Kebribeyah, magnitude, preschool, refugee

Introduction

Micronutrient deficiencies contribute about 7.3% of the total global burden of diseases. Deficiencies, particularly of iron and vitamin A, are frequently the major public health threat and are the main forms of micronutrient malnutrition, which collectively affect more than 4.5 billion people worldwide.1

Anaemia is a global public health problem that affects populations in both rich and poor countries with major consequences for human health, as well as social and economic development. It affects all age groups, but is more prevalent in pregnant women and young children.2 Dizziness, loss of appetite, weakness and fatigue (tiredness), negative effect on cognitive and psychomotor development, poor academic performance, and lethargy are among the adverse health effects of anaemia.3

Anaemia is estimated to affect more than 2 billion individuals worldwide (one in three children). According to the WHO review of nationally representative surveys from 1993 to 2005, an estimated 47.4% of preschool children worldwide suffer from anaemia.2

Children in refugee camps and emergency areas are extremely vulnerable to iron deficiency anaemia and other micronutrient deficiencies.3 This is due to the inadequate food rations, insufficient micronutrient composition, limited access to health services, unhealthy environment, poor feeding and caring practices, and lack of other specialised services needed by displaced individuals.4 In refugee camps of sub-Saharan Africa, especially in Kenya and Ethiopia, the prevalence of anaemia is among the highest in the world.3 A study done in Kakuma Refugee camp, Kenya, revealed an anaemia prevalence of 61.3% in children aged 6–59 months.5

A cross-sectional study (2003) conducted in a Burmese refugee camp among similar age groups reported that the prevalence of iron deficiency (ID), anaemia, and iron deficiency anaemia (IDA) was 85.4%, 72.0% and 64.9%, respectively.7 The 2008 UNHCR annual report on public health and HIV also showed that the prevalence of anaemia among refugee preschool children in the Dadaab camp of Kenya, and Nayapara and Kutupalong camps of Bangladesh was 71.7% and 47.5%, respectively.8 Another study carried out in 2001–2002 on protracted refugee camp dwellers in North and East Africa also documented levels of anaemia that ranged from 12.8% to 72.9% in children among the different camps.9

Several studies conducted in Ethiopia also showed high anaemia prevalence among refugee preschool children. For example, a study in the Fugnido, Shimelba and Teferiber refugee camps, Ethiopia, in 2008 reported a prevalence of 38.6%, 36.0% and 35.6%, respectively.10
However, the predisposing factors to anaemia have not been clearly identified or documented for refugee populations. This study aimed to identify the possible factors that predispose towards the onset and development of anaemia in order to support appropriate intervention strategies that would target refugee populations in the Kebribeyah refugee camp, Somali region, Ethiopia.

**Methodology**

A cross-sectional study with an analytic component was employed in the Kebribeyah refugee camp. Refugee children aged between 6 and 59 months were targeted, during March 2010. The camp is located in the Kebribeyah town and was established in 1991 in the Somali region, Ethiopia, after the fall of the Siad Barre regime. The area is situated approximately 685 km east of the capital city, Addis Ababa. The camp is located between longitude 9°6’N and latitude 43°10’E and at an altitude of 1686 metres above sea level. The climatic condition of the camp is characterised as arid and semi-arid. The refugee camp has one primary school and high school, respectively. It has also one health centre and piped water facility. The camp is arranged into nine sections and has 1 791 households, all of which are occupied, in houses that are made of plastic sheeting or other covering such as ragged bed sheets/clothes. An estimated 16 354 refugees resided in the camp at the time of the study. Of these, 8 355 (51.1%) and 7 999 (48.9%) were females and males, respectively. Approximately 3 272 (20.0%) of the entire refugee population were under 5 years of age, of which girls constituted 1672 (51.1%) and the remaining 1 600 (48.9%) were boys. The majority of the refugees had been in the camp for nearly 18 years.11

The sample size was calculated based on two assumptions. Based on the first assumption, the prevalence of underweight, estimated at 47%12 with a 95% confidence level and with a 3% precision, yielded a sample size of 1 063 households. The second assumption, based on an anaemia prevalence of 36%13 with a 95% confidence level and with a 3% precision, gave a total of 983 households. However, the sample size calculated based on the first assumption was considered as a representative sample size for this study. Nonetheless, as the total number of households was less than 5 000 it required some finite population correction; adding an estimated 10% non-response yielded a final sample size of 734 individuals. In order to obtain the representative sample from the Kebribeyah refugee camp, these 734 individuals were selected from 734 households by considering only one child from each household.

These 734 households with under-five-year-old children were sampled randomly using a random number table. The selected under-five-year-old children were enrolled for various nutritional assessments. Anthropometric (weight and height) measurements were performed on all children, whereas, due to budgetary constraints, haemoglobin was measured only in every other child (thus 60%; n = 440) of the sampled children were recruited for the anaemia study.

Households with under-five-year-old children who lived in the camp during the time of the study, and had families/caregivers who were mentally and physically capable of being interviewed, were randomly selected through simple random sampling. Since newcomer/new arrival refugees were not allowed to live in the camp and were taken to other newly established camps, no discrimination was made in selecting households in terms of the duration that the individuals had lived in the camp as most of the families had resided in the camp for about 18 years, and all under-five-year-old children were born and had grown up in the camp. However, the refugees who were resident in the camp but unavailable, for whatever reason(s), were included in the study if they came back to the camp during the data-collection period and after their identity was confirmed by the Administration for Refugee and Returnee Affairs (ARRA) workers. Where households had more than one under-five-year-old child, only one child was randomly selected, using the lottery method, to exclude duplication of results. A total of 399 refugee preschool children who were present at the time of the study were assessed for various socio-demographic, maternal, child care and environmental health characteristics, as well as anthropometric measurements and anaemia status using a purpose-designed and pre-tested questionnaire.

Forty-two field enumerators were recruited from the health staff of Kebribeyah refugee camp and from the community health agents of the camp. All field workers received training on data-collection techniques for two days. The actual data collection was carried out for five consecutive days following the training. Data collectors were responsible for interviewing caregivers, filling in the questionnaire, and measuring and recording of anthropometric and haemoglobin measurements as well as calibrating the instruments. The enumerators collected data under close supervision of the team supervisors and principal investigator. Analysis for prevalence and severity of anaemia was done on a daily basis by the team supervisors and principal investigator, as was the checking of each completed questionnaire for the quality and completeness of the recorded information.

Weight was measured to the nearest 100 g, using Salter spring-type hanging scales (Zhezhong Weighing Apparatus Factory, Yongkang, China) with the child in minimal clothing. Prior to taking each measurement, the weighing scale with the culottes was adjusted to zero. When the child was restless and the pointer was oscillating, the midpoint of the oscillation was taken as the weight of the child by the measurer reading aloud the midpoint value on the scale. The measurements were then repeated by the data recorder for verification of the value. The average value was calculated and taken as the weight of the child. As a quality check, the weighing scales were tared using a standard 10 kg weight. Height/length was measured to the nearest 0.1 cm using a locally made length-board. Prior to data collection, the weight and height measuring instruments were subjected to quality tests in order to ensure their precision and accuracy.

The health workers among the trained enumerators were responsible for measuring haemoglobin using a HemoCue® photometer (HemoCue America, USA) in which finger prick blood samples were processed and the result explained to the caregivers immediately. The calibration of the HemoCue® machine was done on a daily basis using control cuvettes.

For enhanced data quality control, the HemoCue® was maintained and standardised by strictly following all manufacturer’s instructions and recommended procedures. Prior to taking blood samples, the child’s finger was cleaned with a disinfectant wipe and the first 2–3 drops of blood were wiped away, before filling the micro cuvettes in one continuous process to ensure that there were no air bubbles in the micro cuvettes. Excess blood was wiped off of the micro cuvettes before placing them into the cuvette holder to take the readings. If contaminated with blood, the analyser was turned off (for at least 15 min before reusing) and cleaned, pulling the cuvette holder out of the loading position before cleaning. Replacing the batteries...
ASTYFER CAPSULES

ASTYFER offers patients with iron deficiency various benefits

ASTYFER contains:
- The best-absorbed form of iron
- Folic acid - that promotes the synthesis of haem
- Ascorbic acid (Vitamin C) - improves absorption
- B-Vitamins - fights fatique
- Amino acids (glycine, histidine and lysine) - encourages absorption

Each capsule contains 150 mg of iron fumarate, equal to 49.5 mg of elemental iron

Iron deficiency can leave patients feeling off-colour
Let ASTYFER put your patients in the PINK!

References:
immediately upon indication that they were running low was another measure taken as part of the quality control protocol.

Data were cleaned manually and then entered into Epi Info™ (CDC, Atlanta, GA, USA) software version 3.5.1. The nutritional data (height and weight measurements) were converted into nutritional indices using the WHO 2006 child growth standards. The presence of stunting, underweight or wasting was denoted using height-for-age, weight-for-age, and weight-for-height, where z-scores below minus 2 served as cut-off point. The data were then exported to SPSS® version 16.0 (SPSS Inc, Chicago, IL, USA) for further analysis. Basic descriptive statistics were reported to give a situational overview, bivariate analysis identified the factors associated with anaemia while multivariate logistic regression analysis was performed to control for the potential confounding effects of the various factors. The bivariate and multivariate analyses were expressed as crude odds ratio (COR) and adjusted odds ratio (AOR), respectively. A p-value of < 0.05 was considered statistically significant. The principal investigator conducted the statistical analysis of the data.

Ethical issues
The ethical review committee of the School of Public Health, Addis Ababa University, approved the study for ethical and scientific merit. The United Nations High Commission for Refugees and the ARRA also provided their written support for undertaking the study. In addition, informed consent was obtained with a thumbprint or signature on the consent form from the respective caregiver, after the nature of the study was fully explained to them in their local languages. The rights of families/caregivers to withdraw from the study at any time was explained and respected.

Results
Of the 440 subjects recruited for anthropometric and haemoglobin measurement, 399 had finger-prick blood testing and complete data, giving a 90.7% response. Lack of interest, fear of pain and unavailability of the refugees during the data-collection period were the common reasons for non-response.

For each month, all family members, including children, received food rations with wheat constituting the primary staple food for all households. The households also received blended food, vegetable oil, pulses, sugar and salt. An average ration size of 16 kg wheat, 1.5 kg blended food, 1.5 kg of pulses, 900 g vegetable oil, 450 g of sugar and 150 g of salt was given per person per month. The blended food given to the refugees was not fortified. The amount and composition of the daily ration (Table 1) were derived from both self-reports of the quantity of specific commodity received during the last distribution and from the camp statistics sheet. Nutritional values were derived using calculating sheets developed by Médecins Sans Frontières: Nutrition guidelines, 1st edition, Paris, February 1995.

The mean haemoglobin level among children was 10.7 g/dL (standard deviation pSD ± 1.9), with a range of 5.3–14.6 g/dL, while the percentage of children with a haemoglobin level that was below 11 g/dL was 52.4% (n = 209). The prevalence of stunting, underweight and wasting among those children who had a haemoglobin measurement were 29.3%, 26.8% and 10.3%, respectively (Figure 1). Anaemia was prevalent in all age groups but was highest among children aged 18–29 months; it was divided into mild (8.5%), moderate (48.1%) and severe (16.3%), the latter two categories being significant (p < 0.05; Table 2). There was no gender difference in the severity of moderate and severe anaemia.

The factors that were associated with anaemia (Table 3) included the age of the child, paternal education, number of under-five-year-old children in the household, not consuming the entire ration by the household, inadequacy of food ration stock, presence of diarrhoea, personal hygiene of child (number of baths a child took), stunting and underweight. However, child gender, family size, exclusive breast feeding, duration of breast feeding, tea consumption, use of cows milk, weight-for-height (wasting), antenatal care, use of family planning methods, acute respiratory infection (ARI), toilet facility and household water consumption were not associated with anaemia.

The prevalence of anaemia among children of fathers with no education was almost two times higher than of those children with

<table>
<thead>
<tr>
<th>Ration component</th>
<th>Monthly ration (kg/person/month)</th>
<th>Daily ration (g/person/day)</th>
<th>Energy (kcal)</th>
<th>Protein (grams)</th>
<th>Fat (grams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>16</td>
<td>533</td>
<td>1758.9</td>
<td>65.6</td>
<td>8.0</td>
</tr>
<tr>
<td>Blended food</td>
<td>1.5</td>
<td>50</td>
<td>180</td>
<td>8</td>
<td>0.65</td>
</tr>
<tr>
<td>Vegetable oil</td>
<td>0.9</td>
<td>30</td>
<td>265.5</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Pulses</td>
<td>1.5</td>
<td>50</td>
<td>167.5</td>
<td>11</td>
<td>0.75</td>
</tr>
<tr>
<td>Sugar</td>
<td>0.45</td>
<td>15</td>
<td>60</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Iodised salt</td>
<td>0.15</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>20.5</td>
<td>683</td>
<td>2431.9</td>
<td>84.6</td>
<td>39.4</td>
</tr>
<tr>
<td>Minimum requirements</td>
<td>2100</td>
<td>52.5</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage supplied by ration</td>
<td>115.8%</td>
<td>161.1%</td>
<td>98.5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Prevalence of under-nutrition among refugee preschool children in the Kebribeyah refugee camp, Somali region, Ethiopia
fathers who had basic education (OR = 1.8, 95% CI 1.1–2.8); two times higher among children who had diarrhoea than their counterparts (OR = 2, 95% CI 1.2–3.3); three times higher among children who took baths once per week than those who took baths daily (OR = 3, 95% CI 1.6–5.8); and 1.5 times higher in households having two or more under-five-year-old children (OR = 1.5, 95% CI 1.1–2.3) than their counterparts. Similarly, the prevalence of anaemia was 1.6 times higher in households that did not consume the entire ration (either shared their ration with neighbours/other families or sold part of it) than those households that consumed the entire ration (OR = 1.6, 95% CI 1.1–2.5); and 1.9 times higher in households where the duration of the ration lasted 15–20 days compared with those in which the ration lasted longer, 26–30 days (OR = 1.9, 95% CI 1.2–3.1). Stunted and underweight children were also, respectively, 2.2 times (OR = 2.2, 95% CI 1.4–3.4) and 2.5 times (OR = 2.5, 95% CI 1.5–3.9) more likely to be anaemic than those who were well nourished.

However, in the multivariate analysis, only child age, number of under-five-year-old children in the household and overweight (weight-for-age) retained their association with anaemia. Regression analysis including the subject characteristics demonstrated that the risk of anaemia was higher for children who were overweight and in lived households that had two or more under-five-year-old children. Underweight children were 2.2 times more likely to be anaemic than their counterparts (AOR = 2.2, 95% CI 1.2–4.1). Results of the adjusted odds ratio showed the factors associated with anaemia by controlling for confounding factors.

Discussion
Iron deficiency anaemia is considered to be the most prevalent micronutrient deficiency worldwide, especially among refugee populations. According to WHO's classification, anaemia levels of ≥ 40%16 are an indication of a severe public health problem. The study thus revealed anaemia as a severe public health problem in Kebribeyah refugee camp. The overall prevalence of anaemia observed among the study participants was 52.4%, which, when further disaggregated by degree of severity into mild, moderate and severe, that is, 5.3%, 36.6% and 10.5%, respectively, indicate lower prevalence of mild anaemia at the population level.

The low prevalence of mild anaemia established in this study is likely to be due to anaemia's asymptomatic nature; often it escapes detection. Second, the family or caregivers, in an effort to gain better medication and additional benefits for their children, probably prefer to present, for haemoglobin assessment, the child/children who appear sick (to them) rather than those who look healthy. This is consistent with findings of a study done in Tanzania which found a similar distribution, with lower prevalence of mild anaemia: mild (16.5%), moderate (33%) and severe (27.7%) anaemia.16

The prevalence of anaemia from this study is higher when compared with that reported in studies conducted in Fugnido (38.6%), Shimelba (36%) and Teferiber (35.6%) refugee camps in Ethiopia16 as well as in other camps, Nayapara and Kutupalong in Bangladesh, where the prevalence was 47.5%, respectively.6 On the other hand, the prevalence of anaemia in the present study was lower when compared with the prevalence in Burmese camps (72%) and the Kakuma and Dadaab refugee camps in Kenya, which were 61.3% and 71.7%, respectively, and Palestinian refugee camps (67%).6,4,16 Overall, the findings of this study are within the range of those reported for protracted refugee camp surveys in 2001 from North and East Africa, where prevalence ranged from 12.8% in Kebribeyah, Tindouf (35.3%), Kakuma (61.3%), Fugnido (62.9%), to 72.9% in Acholpi.9

The increasing prevalence of anaemia from 12.8% in 2001 to 52.4% in the current study might be attributable to insufficient food ration, sharing/selling part of food ration, presence of diarrhoea, poor personal hygiene of the child, nutritional problems such as stunting (29.3%) and underweight (26.8%). The other important factors were child age and the presence of high number of under-five-year-old children in households that increase food competition or sharing among young children.

The study also found that 8.5%, 48.1% and 16.3% of children aged 18–29 months had mild, moderate and severe anaemia, respectively, suggesting that late infancy and early childhood (particularly children between 6 and 36 months) are high-risk periods for iron deficiency. This might be due to rapid growth spurts leading to increased iron requirements that are not met by dietary intake.11,17

Table 2: Prevalence of anaemia among refugee preschool children by sex and age in the Kebribeyah refugee camp, Somali region, Ethiopia

<table>
<thead>
<tr>
<th>Child characteristics</th>
<th>No. (%)</th>
<th>Mild anaemia (Hb 10–10.9 gm/dL)</th>
<th>Moderate anaemia (Hb 7–9.9 gm/dL)</th>
<th>Severe anaemia (Hb &lt; 7 gm/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No (%)</td>
<td>OR (95% CI)</td>
<td>No (%)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>216 (54.1)</td>
<td>12 (5.6)</td>
<td>0.9 (0.5, 1.9)</td>
<td>84 (38.9)</td>
</tr>
<tr>
<td>Female</td>
<td>183 (45.9)</td>
<td>9 (4.9)</td>
<td>1</td>
<td>62 (33.9)</td>
</tr>
<tr>
<td>Age (in months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6–17</td>
<td>74 (18.5)</td>
<td>5 (6.8)</td>
<td>3.1 (0.7, 33.1)</td>
<td>30 (40.5)</td>
</tr>
<tr>
<td>18–29</td>
<td>129 (32.3)</td>
<td>11 (8.5)</td>
<td>3.5 (1.0, 46.9)</td>
<td>62 (48.1)</td>
</tr>
<tr>
<td>30–41</td>
<td>86 (21.6)</td>
<td>3 (3.5)</td>
<td>2.3 (0.9, 31.3)</td>
<td>25 (29.1)</td>
</tr>
<tr>
<td>42–53</td>
<td>68 (17.0)</td>
<td>1 (1.5)</td>
<td>0.6 (0.1, 11.0)</td>
<td>24 (35.3)</td>
</tr>
<tr>
<td>54–59</td>
<td>42 (10.5)</td>
<td>1 (2.4)</td>
<td>1</td>
<td>5 (11.9)</td>
</tr>
</tbody>
</table>

*Significant at p < 0.05.
Table 3: Factors associated with anaemia among refugee preschool children in the Kebribeyah refugee camp, Somali region, Ethiopia

<table>
<thead>
<tr>
<th>Factor</th>
<th>Anaemia No. (%)</th>
<th>Crude OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>120 (55.6)</td>
<td>1.3 (0.9, 2.0)</td>
<td>1.3 (0.9, 2.0)</td>
</tr>
<tr>
<td>Female</td>
<td>89 (48.6)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Child age (in months)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6–17</td>
<td>45 (60.8)</td>
<td>7.8 (3.0, 19.8)*</td>
<td>6.4 (2.3, 17.4)*</td>
</tr>
<tr>
<td>18–29</td>
<td>94 (72.9)</td>
<td>13.4 (5.5, 33.0)*</td>
<td>13.5 (5.3, 34.1)*</td>
</tr>
<tr>
<td>30–41</td>
<td>37 (43)</td>
<td>3.8 (1.5, 9.4)*</td>
<td>3.9 (1.5, 9.9)*</td>
</tr>
<tr>
<td>42–53</td>
<td>26 (38.2)</td>
<td>3.1 (1.2, 8.0)*</td>
<td>3.4 (1.3, 8.9)*</td>
</tr>
<tr>
<td>54–59</td>
<td>7 (16.7)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mother had formal education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>19 (39.6)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>188 (55.6)</td>
<td>1.8 (1.0, 3.3)</td>
<td>0.2 (0.0, 3.0)</td>
</tr>
<tr>
<td>Father had formal education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>42 (42)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>161 (56.5)</td>
<td>1.8 (1.1, 2.8)*</td>
<td>0.6 (0.4, 1.0)</td>
</tr>
<tr>
<td>Number of under-5 children</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>79 (45.7)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>102 (56.4)</td>
<td>1.5 (1.1, 2.3)*</td>
<td>1.7 (1.1, 2.6)*</td>
</tr>
<tr>
<td>&gt;= 3</td>
<td>28 (62.2)</td>
<td>2.0 (1.1, 3.8)*</td>
<td>2.3 (1.1, 4.7)*</td>
</tr>
<tr>
<td>Mother had antenatal care (ANC) visit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>204 (52.3)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>3 (50)</td>
<td>0.9 (0.2, 4.6)</td>
<td>1.0 (0.2, 5.1)</td>
</tr>
<tr>
<td>Household consumed all the ration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>108 (47.2)</td>
<td>1.6 (1.1, 2.5)*</td>
<td>1.4 (0.9, 2.2)</td>
</tr>
<tr>
<td>No</td>
<td>101 (59.4)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Duration ration lasted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–20 days</td>
<td>93 (57.8)</td>
<td>1.9 (1.2, 3.1)*</td>
<td>1.6 (1.0, 2.8)</td>
</tr>
<tr>
<td>21–25 days</td>
<td>72 (54.1)</td>
<td>1.6 (1.0, 2.7)</td>
<td>1.4 (0.8, 2.5)</td>
</tr>
<tr>
<td>26–30 days</td>
<td>44 (44.1)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Child received Vitamin A Supply (VAS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>180 (53.6)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>8 (50)</td>
<td>0.9 (0.3, 2.3)</td>
<td>0.9 (0.3, 2.8)</td>
</tr>
<tr>
<td>Child consumed tea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>115 (53.5%)</td>
<td>0.9 (0.6, 1.3)</td>
<td>1.0 (0.6, 1.4)</td>
</tr>
<tr>
<td>No</td>
<td>94 (51.1%)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Child had diarrhoea</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>55 (65.5)</td>
<td>2.0 (1.2, 3.3)</td>
<td>1.0 (0.6, 1.7)</td>
</tr>
<tr>
<td>No</td>
<td>40 (50.5)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Child had Acute Respiratory Infection (ARI)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>24 (63.2)</td>
<td>1.7 (0.8, 3.3)</td>
<td>1.5 (0.7, 3.3)</td>
</tr>
<tr>
<td>No</td>
<td>165 (49.4)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Amount of water household consumed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 20 L</td>
<td>6 (50)</td>
<td>1.0 (0.2, 5.2)</td>
<td>1.0 (0.2, 5.3)</td>
</tr>
<tr>
<td>20–40 L</td>
<td>62 (61.4)</td>
<td>1.6 (1.0, 2.6)</td>
<td>1.6 (1.0, 2.5)</td>
</tr>
<tr>
<td>&gt; 40 L</td>
<td>144 (49.3)</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

(Continued)

Table 3: (Continued)

<table>
<thead>
<tr>
<th>Number of baths child took per week</th>
<th>Anaemia No. (%)</th>
<th>Crude OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once</td>
<td>54 (70.1)</td>
<td>3.0 (1.6, 5.8)*</td>
<td>1.7 (0.8, 3.6)</td>
</tr>
<tr>
<td>Twice</td>
<td>44 (47.8)</td>
<td>1.2 (0.7, 2.1)</td>
<td>0.7 (0.4, 1.4)</td>
</tr>
<tr>
<td>Every other day</td>
<td>73 (51.0)</td>
<td>1.3 (0.8, 2.3)</td>
<td>0.9 (0.5, 1.7)</td>
</tr>
<tr>
<td>Daily</td>
<td>38 (43.7)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Stunting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>77 (65.8)</td>
<td>2.2 (1.4, 3.4)*</td>
<td>1.5 (0.9, 2.6)</td>
</tr>
<tr>
<td>No</td>
<td>132 (46.8)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Underweight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>73 (68.2)</td>
<td>2.5 (1.5, 3.9)*</td>
<td>2.2 (1.2, 4.1)*</td>
</tr>
<tr>
<td>No</td>
<td>136 (46.6)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Wasting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>23 (56.1)</td>
<td>1.2 (0.6, 2.3)</td>
<td>0.8 (0.3, 1.7)</td>
</tr>
<tr>
<td>No</td>
<td>186 (52)</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: Antenatal care (ANC); Vitamin A Supply (VAS); Acute Respiratory Infection (ARI)
*Significant at $p < 0.05.$

The study results are also consistent with those of a study that was conducted in the rural areas of Indonesia, which documented that current diarrhoea or recent history of diarrhoea was significantly associated with anaemia. Those considered anaemic were more likely to be younger, stunted, underweight, and from families with low paternal/maternal education,19 which underscores the need for appropriate nutrition service and public health intervention measures. The study results also indicate that the food ration that is consumed at the household level is inadequate in terms of affording protection to the majority of young refugee children against developing iron deficiency anaemia.

Iron deficiency anaemia is a significant public health problem and is amongst the most prevalent micronutrient deficiencies in most refugee populations including children. This is due to their living conditions, which predisposes them to different micronutrient deficiencies.7,9,15,20 In addition, anaemia is a nutritional disorder that is compounded by insufficient micronutrient supply in food rations, inadequate food ration, poor nutrition services, high burden of communicable diseases and poor environmental sanitation.6,8,21,22 Thus the situation requires both nutrition-specific and nutrition-sensitive interventions, hence the need for due attention by food aid agencies and camp management in ensuring adequate iron and overall nutrient content in food ration and optimising nutrient utilisation through prevention of conditions such as diarrhoea and other illnesses. A combination of food ration fortification with micronutrients, especially iron, iron supplementation for special cases, and early diagnosis of anaemia to mitigate against onset of anaemia would be a good composite strategy, particularly if supported by early treatment. Other indirect interventions, such as empowering refugees to engage in homestead small-scale food production by providing suitable lands (soils), and the introduction of cash transfer interventions to stimulate income generation such as trade would help in reducing shortages of food supply among refugee populations.
The achievement of these aims requires a supportive policy environment and collaboration amongst key stakeholders who should include beneficiaries (refugees), food aid agencies and refugee camps’ management. Responsible utilisation of food rations for improved nutrition should be instilled and tracked through implementation research.

Improving environmental health conditions (such as provision of adequate supply of safe and adequate water, prevention of contamination of food and water, personal hygiene and use of toilet) to prevent diarrhoea, and provision of non-food items (such as shoes, blankets and clothes) to curb selling part of rations would most likely contribute towards reduced anaemia prevalence. Improved multi-sectoral collaboration among different organisations involved in refugee camps is also likely to be useful in mitigating against the multi-faceted causes of anaemia.

The study was restricted to the under-five-year-old children in the refugee camp, and as such anaemia of varying severity among refugee school-aged children in this setting needs to be investigated. Other limitations of the study include the cross-sectional study design, which does not address seasonality; neither does it establish causal relationship. Furthermore, an assessment that would explore why the prevalence of mild anaemia occurred with the lowest frequency might also lead to a better understanding of social and environmental factors that predispose to anaemia.

In conclusion, the present study confirms that anaemia among young refugee children is a significant public health problem in the Kebribeyah refugee camp in Ethiopia and that it basically coexists with underweight. A number of factors are associated with anaemia among young refugee children but the three key contributing factors are the age of the child, the number of children under the age of five years in a household and being underweight. Direct nutrition interventions to address deficits in dietary intake and optimisation of nutrient utilisation, propped up with nutrition-sensitive interventions are recommended. Application of appropriate well-designed implementation research to assess utilisation of rations by households and to establish ways of detecting anaemia at the earliest stages of onset for pre-planned effective action is also recommended.

Acknowledgements – The authors express their gratitude to the School of Public Health, Addis Ababa University for funding the study and also thank the UNHCR, Department of Public Health and Nutrition, and Administration for Refugee and Returnee Affairs, Health Department for their cooperation and provision of essential materials required during the study period. The supports obtained from Dr Dejene Kebede and Ato Mulugeta Weldetsadik from UNHCR, and Ato Daniel Aylele from the Administration for Refugee and Returnee Affairs (ARRA) including the Kebribeyah refugee camp health staff, study participants, data collectors and all others involved in this study are duly acknowledged.

References


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Child factors associated with complementary feeding practices in Uganda

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Introduction
Complementary feeding is essential if children are to grow and develop properly. Adequate complementary feeding entails feeding children aged between 6 and 23 months with foods from four or more food groups at least twice a day.¹² Bottle-feeding (bottle-feeding, herein, refers to the use of a bottle with nipple/teat), duration of breastfeeding, continued breastfeeding to one year and continued breastfeeding to two years are four of the eleven indicators recommended by the World Health Organisation (WHO) for assessing the quality of complementary feeding.¹ Inadequate feeding practices are among the main causes of under-nutrition among children of this age.¹ Wasting and stunting typically accelerate between the ages of 6 and 23 months, the phase when complementary feeding is needed, partly because the child becomes increasingly independent and mobile and thus exposed to environmental contaminants.² Common childhood illnesses, such as diarrhoea, affect complementary feeding by reducing a child’s appetite.¹ Health workers tend to advise caregivers on complementary feeding practices during immunisation consultations.⁶

At least 6% of deaths of children under five years of age could be prevented by adequate complementary feeding.³ Feeding children aged 6 to 23 months with diversified diets of four or more food groups at least twice a day can prevent micronutrient deficiencies, stunting and wasting.⁷,⁹ Supplementing breastfeeding with nutritious complementary foods can reduce stunting among children of this age by 20%.⁷ Understanding the child factors associated with complementary feeding practices is important to support governments and their partners in designing and implementing programmes to prevent child under-nutrition by promoting nutritious complementary feeding diets. Children of low birth weights tend to have low iron stores at 4 to 18 months of age.¹⁰ Breastfeeding beyond six months of age does not provide adequate haemoglobin as breast milk does not contain sufficient iron to meet the needs of children of this age.¹⁰,¹¹ Bottle-feeding, on the other hand, poses risks of anaemia¹² and contamination with harmful pathogens. Cows’ milk, which is most commonly offered in bottle-feeding in developing countries, does not contain adequate iron for children aged 6 to 23 months. Thus, emphasising the role of introducing iron rich complementary foods with high iron content from the age of 6 months e.g. foods from animal sources such as eggs.⁴,⁶,¹⁵

The age of the child is an important consideration in assessing the adequacy of complementary feeding practices.¹⁰ Eruption of teeth influences when to introduce complementary feeding, but the process typically leads to a loss of appetite which affects food intake. Secondary analysis of Demographic and Health Surveys in Ethiopia conducted by Melkam et al.¹⁷ and in Nepal by Khana et al.¹⁸ indicated that as children grow older their diets typically become more diverse.

Although Uganda has prioritised appropriate complementary feeding as a key child development practice, very little research has been conducted on the generalised factors related to

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RESEARCH

Objectives: The objective of the study was to identify child factors that influenced complementary feeding practices in 2006 and 2011 in Uganda.

Design: Trend analysis of Uganda Demographic and Health Surveys (UDHS) from 2006 and 2011.

Subjects and setting: Children aged 6 to 23 months, Uganda.

Results: Between 2006 and 2011, the percentage of children in Uganda consuming an adequate complementary diet increased by 3.1%. Duration of breastfeeding increased in this time from 11 months to 12 months, with the percentage of mothers who were still breastfeeding their children at two years decreasing from 55.2% to 46.5%. Factors such as child’s age, deworming for intestinal parasites and receiving DPT3 and measles vaccines, increased the likelihood of caregivers providing children with a minimum acceptable diet. Children aged 6 to 8 months and 12 to 17 months tended to receive adequate complementary in both 2006 and 2011. Although bottle-feeding was highest among the children aged 6 to 11 months, amongst those reported with a fever, acute respiratory infection (ARI) or diarrhoea, it had no statistically significant effect in either 2006 or 2011.

Conclusion: Caregivers who take their children for deworming and DPT3 and measles vaccinations are more likely to feed them adequate diets, especially those aged 6 to 17 months. This is probably due to the mothers’ interaction with healthcare practitioners who teach and support complementary feeding. Telling caregivers about complementary feeding practices during immunisation and deworming consultations is likely to encourage beneficial complementary feeding practices in Uganda.

Keywords: child age, complementary feeding, deworming, immunisation, Uganda Demographic and Health Survey
complementary feeding practices and their impact on child nutrition. The national representative demographic and health surveys provide a hitherto unexplored opportunity to examine the relationship between child factors and complementary feeding practices over the past decade. Understanding the child factors associated with complementary feeding practices is important in designing and implementing programmes to promote adequate complementary feeding to overcome child undernutrition in Uganda. The present paper identifies plausible child-related factors that could have influenced complementary feeding practices in Uganda in 2006 and 2011. This study also fills a knowledge gap, as there is scant information on child factors influencing complementary feeding practices in Africa.

**Methods**

**Study design**

The study used a comparative analysis of secondary data from the Uganda Demographic and Health Surveys (UDHS) conducted from May to October 2006 and June to December 2011, to show trends in the coverage of key indicators of complementary feeding and to establish the factors associated with complementary feeding practices during the two periods. The UDHS is a national representative survey of women aged 15 to 49 years and men aged 15 to 54 years, conducted every five years. It covered 8 830 households in 2006 and 10 086 in 2011, in nine regions in 2006 and ten in 2011. The regions covered by the two surveys were Kampala, Central 1, Central 2, East Central, Eastern, Karamoja, North, West Nile, Western and Southwest. In 2006, Karamoja was part of the northern region and was not included, but it was included in 2011 after the government made it a special region.21

The UDHS collects data on fertility and family planning; infant, child, and maternal mortality; maternal and child health; nutrition; and, knowledge on HIV/AIDS and other sexually transmitted diseases. The women in the sampled households with children between the ages of 6 and 23 months were asked about the liquid, semisolids and solid foods fed to their children in the 24 h prior to the survey.22 They were asked whether the child was still breastfed, and if the answer was no or the child had already been weaned, how many months the child had breastfed.21

**Study setting**

Uganda is a landlocked country in east Africa, bordering Kenya to the east, Tanzania to the south, Rwanda to the southwest, the Democratic Republic of Congo to the west, and South Sudan to the north. Uganda has sufficient food at aggregate level to feed its population,22,23 but has a high prevalence of stunting (33%).24 Uganda has a relatively low prevalence of wasting (4%) among children under five years of age.25 Stunting among Ugandan children under five years of age decreased by 4.7% between 2006 and 2011, and wasting by 1.4% over the same period, but these are relatively modest reductions.25 Vitamin A deficiency in children between 6 and 59 months in Uganda increased from 20% in 2006 to 38% in 2011.26 The level of anaemia (50%) among these children remains high (62%) and poses a serious public health problem.24,25

The country continues to face a high prevalence of three common childhood illnesses among children under five years of age: acute respiratory infection (ARI), fever and diarrhoea. In the two weeks before the 2006 UDHS survey, 15% of children under five had shown symptoms of ARI, 41% had a fever and 26% had diarrhoea. In the two weeks before the UDHS survey in 2011, 15% of children under five had shown symptoms of ARI, 40% had a fever and 23% had diarrhoea. The 2011 UDHS also showed that children aged 6 to 23 months were more prone to diarrhoea than older children.25

**Participants**

The participants in the survey were women aged 15 to 49 years in all the surveyed households, and a sub-sample of men aged 15 to 54 years from one third of the households where there were women aged 15 to 49 years. The women were asked for demographic information, such as age and education, and for information on reproductive and maternal health, gender-based violence, breastfeeding and infant feeding practices, vaccinations and their children’s illnesses. The men were asked for the same information apart from maternal and child health aspects. Anthropometry measurements were taken for all children aged 6 to 59 months in the sampled households, and also underwent haemoglobin tests. The present study used a subset of data from the 2006 and 2011 UDHS for mothers who were living with children aged 6 to 23 months.25

**Ethical considerations**

The authors obtained approval from ICF International Inc. to use the secondary UDHS dataset. The UDHS 2006 and 2011 data downloaded from the ICF International Inc. website did not contain names or other individual identifiers of women or children that could have invaded their privacy.

**Data collection**

In both surveys for 2006 and 2011, the dietary intake of children 6 to 23 months of age was assessed using a 24 h food frequency recall questionnaire. The interviewers asked women with children 6 to 23 months whether the child was still breastfed; and, if not, how long the child had been breastfed, and what liquid, semi-solid and solid foods had been consumed by the child during the 24 h preceding the survey. Blood samples were collected from all children aged 6 to 59 months whose mothers consented to the tests.23 Laboratory technicians carried out haemoglobin analysis on-site using a battery operated portable HemoCue® analyser. Participants received the results verbally and in writing. The data collectors advised parents of children with a haemoglobin level under seven grams per decilitre (g/dl) to take the child to a health facility for follow-up care. The Uganda Bureau of Statistics adjusted the results for altitude.21

In both surveys for 2006 and 2011, children’s heights were measured using recumbent length on a measuring board.28 The data on the prevalence of ARI, fever and diarrhoea were gathered by asking mothers whether their child had had a cough accompanied by short, rapid breathing and fever (symptoms of ARI), been ill with fever or had diarrhoea in the two weeks preceding the survey. These data are subjective (i.e. based on the mother’s perception of illness) and were not validated by a medical examination. The interviewers also asked whether the child had been dewormed for intestinal parasites in the six months preceding the survey and whether the child had received Vitamin A supplementation.

**Independent and dependent variables**

The dependent complementary feeding variables in this study were: a minimum acceptable diet; minimum dietary diversity; minimum meal frequency; bottle-feeding; continued breastfeeding at one year; continued breastfeeding at two years; and, duration of breastfeeding. Table 1 provides a summary of the WHO definitions of these indicators.21
Child factors associated with complementary feeding practices in Uganda

Odds ratios (ORs) with 95% confidence intervals (CIs) were used to estimate the strength of association between the independent variables and the dependent variables of the minimum acceptable diet and bottle-feeding. Statistical analyses were performed with IBM SPSS 19.0. Adjustments were made for the cluster sampling design. The Taylor series linearisation method was used to estimate the CIs of prevalence estimates. All associations with \( p < 0.05 \) were considered statistically significant.

**Results**

**Trends in complementary feeding practices in 2006 and 2011**

The results from the comparative analysis (see Table 2) indicated statistically significant differences in the probabilities of children consuming the minimum acceptable diet \((p = 0.027)\), consuming diets of minimum dietary diversity \((p = 0.047)\), continued breastfeeding at two years \((p = 0.024)\), and bottle-feeding \((p < 0.001)\) in 2006 and 2011. The probabilities of achieving the minimum meal frequency \((p = 0.065)\) and continued breastfeeding at one year \((p = 0.060)\) were not significantly different between 2006 and 2011.

Between 2006 and 2011 there were increases of 3.1\% in the percentage of children in our sample receiving a minimum acceptable complementary diet, 3.1\% in the percentage receiving diets of the minimum recommended dietary diversity, 2.8\% in the percentage achieving the minimum recommended meal frequency, and 5.7\% in the percentage who were bottle-fed. The percentage of children breastfed up to one year and those still breastfed at two years respectively decreased by 3.8\% and 8.7\% between 2006 and 2011. However, the median duration of breastfeeding in our sample increased from 11 months in 2006 to 12 months in 2011.

**Association between child factors and complementary feeding practices in 2006 and 2011**

The Pearson chi-square analysis (Table 3 and Table 4) showed that children who were dewormed were more likely to consume the minimum dietary diversity (27.4\% and \( p < 0.001 \) in 2006 and 28.8\% and \( p < 0.001 \) in 2011) than those who were not dewormed (21.1\% in 2006 and 24.3\% in 2011). Consuming the minimum acceptable diet in 2011 was also associated with having had DPT3 and measles vaccinations. Consuming a diet with the minimum dietary diversity in 2006 and 2011 was associated with older children \((p < 0.001)\) and being dewormed \((p < 0.001)\). Younger children tended to consume meals more frequently \((p < 0.001)\). Children with anaemia \((p = 0.033)\) and those who had had a fever \((p = 0.032)\) or ARI \((p = 0.009)\) were the most likely age group to receive the minimum meal frequency in 2011 but not in 2006.

Children aged 18 to 23 months were less likely than those aged 6 to 8 months and 12 to 17 months to consume the minimum acceptable diet in both 2006 and 2011. The percentage of children aged 6 to 8 months consuming the minimum acceptable diet remained constant at 29.0\% in 2006 and 2011. Children aged 12 to 17 months were more likely than the other age groups to consume the minimum acceptable diet and minimum dietary diversity in both years. The percentage of 12 to 17 month old children who consumed diets with the minimum dietary diversity increased from 63.1\% in 2006 to 66.6\% in 2011, suggesting a risk.

---

Table 1: WHO complementary feeding indicators and their definitions

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continued breastfeeding at 1 year</td>
<td>Proportion of children aged 12 to 15 months fed on breast milk</td>
</tr>
<tr>
<td>Continued breastfeeding at 2 years</td>
<td>Proportion of children aged 20 to 23 months fed on breast milk</td>
</tr>
<tr>
<td>Duration of breastfeeding</td>
<td>Median duration of breastfeeding among children less than 36 months of age. However, for this study, the authors operationally defined the duration of breastfeeding as the median duration of breastfeeding among children less than 24 months since they studied only children of age 6 to 23 months</td>
</tr>
<tr>
<td>Minimum dietary diversity</td>
<td>Proportion of children 6 to 23 months who receive foods from 4 or more food groups</td>
</tr>
<tr>
<td>Minimum meal frequency</td>
<td>Proportion of breastfed and non-breastfed children 6 to 23 months who consume solid, semi-solid or soft foods (including milk feeds for non-breastfed children) the minimum number of times or more.</td>
</tr>
<tr>
<td>Minimum acceptable diet</td>
<td>Proportion of children 6 to 23 months who consumed the minimum dietary diversity and minimum meal frequency in the past 24 h</td>
</tr>
<tr>
<td>Bottle-feeding*</td>
<td>Proportion of children 0 to 23 months who are fed with a bottle with nipple/teat</td>
</tr>
</tbody>
</table>

*Throughout this paper, bottle-feeding refers to the use of a bottle with nipple/teat.

The independent variables were child-related: age; sex; child morbidity status (fever, acute respiratory infection and diarrhoea); birth weight; nutritional status (anaemia, stunting and wasting); vitamin A supplementation; deworming; and, DPT3 and measles vaccinations.

**Data analysis**

For the sociodemographics of the study population, the authors analysed the entire weighted data subset, 2 958 cases in 2006 and 2 814 in 2011, of children between 6 and 23 months who lived with their mothers.

Complementary feeding indicators were expressed as dichotomous variables: ‘0’ denoting breastfeeding for 0 to 11 months; and, ‘1’ denoting consumption of the minimum acceptable diet, minimum dietary diversity, minimum meal frequency, breastfeeding for 12 to 23 months, and bottle-feeding.

The Pearson chi-square test \((\chi^2)\) was used to determine the binomial association between the child factors and whether the child consumed the minimum acceptable diet, minimum dietary diversity, minimum meal frequency, and was bottle-fed. Stepwise backward multiple logistic regression was used to identify the independent variables that influenced complementary feeding practices. Only the independent variables with \( p < 0.05 \) were retained in the final model.
The Pearson chi-square test (frequency, breastfeeding for 12 to 23 months, and bottle-feeding. and 2814 in 2011, of children between 6 and 23 months who analysed the entire weighted data subset, 2958 cases in 2006. For the sociodemographics of the study population, the authors DPT3 and measles vaccinations.

and wasting); vitamin A supplementation; deworming; and, diarrhoea); birth weight; nutritional status (anaemia, stunting morbidity status (fever, acute respiratory infection and

* Throughout this paper, bottle-feeding refers to the use of a bottle with cy in the past 24 h

Minimum acceptable diet

<table>
<thead>
<tr>
<th>Feeding practice</th>
<th>Survey year</th>
<th>Pearson χ²</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2006</td>
<td>2011</td>
<td></td>
</tr>
<tr>
<td>Minimum acceptable diet</td>
<td></td>
<td></td>
<td>0.027</td>
</tr>
<tr>
<td>No</td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1589</td>
<td>76.8</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>481</td>
<td>23.2</td>
<td></td>
</tr>
<tr>
<td>Minimum dietary diversity</td>
<td></td>
<td></td>
<td>0.047</td>
</tr>
<tr>
<td>No</td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>943</td>
<td>45.0</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1154</td>
<td>55.0</td>
<td></td>
</tr>
<tr>
<td>Minimum meal frequency</td>
<td></td>
<td></td>
<td>0.065</td>
</tr>
<tr>
<td>No</td>
<td>n</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1315</td>
<td>64.7</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>n</td>
<td>%</td>
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<td></td>
<td>189</td>
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Table 2: Prevalence of complementary feeding practices in 2006 and 2011

Children aged 6 to 8 months and 12 to 17 months were more likely than the other age groups to be fed with the minimum meal frequency in both 2006 and 2011. Children aged 18 to 23 months were the least likely group to be fed with the minimum meal frequency both in 2006 (28.8%) and 2011 (31.8%). The percentage of children aged 6 to 8 months who were fed with the minimum meal frequency increased by 2.8%, and the percentage of those aged 12 to 17 months who were fed with the minimum meal frequency increased by 2.0% in 2011.

Table 3 shows that bottle-feeding had a significant association with the sex and age of the child; birth weight; DPT3 and measles vaccination; fever, diarrhoea and ARI; vitamin A supplementation; and, deworming in the previous six months. In both 2006 and 2011, bottle-feeding was significantly higher among children aged 6 to 11 months and children with fever, ARI or diarrhoea than among those aged 12 to 23 months and those who did not have these ailments.

In 2006, more children with normal birth weights (18.2%) were bottle-fed than children with low birth weights (17.2%). The reverse was the case in 2011, with 27.1% of children with low birth weights being bottle-fed compared with 23.2% of those with normal birth weights. In 2011, 25.7% of children who had had diarrhoea in the two weeks prior to the survey were bottle-fed. In 2006 the percentage of children who had or not had diarrhoea and were bottle-fed was about the same, about 18%. In 2011, more children who had received vitamin A supplementation (25.5%) were bottle-fed than those who had not received vitamin A.

Child factors that influenced complementary feeding practices in 2006 and 2011

The results from the multiple logistic analysis of the 2011 data are presented in Table 5. In 2011, child’s age, DPT3 and measles vaccinations and deworming were significant predictors of consumption of the minimum acceptable diet (p < 0.05). Children who were vaccinated were 1.9 times more likely to be fed the minimal acceptable diet and 1.5 times more likely to be fed the minimum dietary diversity than those who were not vaccinated. Children who were dewormed were 1.3 times more likely to be fed the minimal acceptable diet and 1.4 times more likely to be fed the minimum dietary diversity than those who were not dewormed. Compared with children aged 6 to 8 months, children aged 9 to 11 months were 2.0 times more likely, those 12 to 17 months 2.5 times more likely, and those 18 to 23 months 1.9 times more likely to have been fed the minimum dietary diversity. Children who had been vaccinated were 1.7 times more likely, and children who had been dewormed 1.5 times more likely, to receive the minimum meal frequency.

The results from the multiple logistics analysis of the 2006 data are presented in Table 6. The likelihood of being fed the minimum acceptable diet increased among children from 9 to 11 months and 12 to 17 months. Children who had been dewormed were 1.4 times more likely to be fed the minimum acceptable diet than those who were not dewormed. Children who had been vaccinated were 1.5 times more likely to be fed the minimum acceptable diet than those who had not been vaccinated. The minimum dietary diversity indicator was influenced by the child’s age, DPT3 and measles vaccination and vitamin A supplementation. Children who had been vaccinated were 1.4 times more likely to be fed the minimum dietary diversity than those who had not been vaccinated. Children who had been dewormed were 1.3 times more likely to be fed the minimum dietary diversity than those who had not been dewormed. Children who received vitamin A supplementation were 1.2 times more likely to be fed the minimum dietary diversity than those you did not receive the vitamin A supplements. Children aged 12 to 17 months had the highest odds of being fed the minimum dietary diversity (OR = 2.648), followed by those aged 9 to 11 months (OR = 2.227). More children aged 9 to 11 months and 12 to 17 months were being fed the minimum dietary diversity than those aged 6 to 8 months and 18 to 23 months. The findings from the multiple logistics analysis showed there were no significant associations between child factors and bottle-feeding in 2006.
The study also showed that while the overall quality of complementary feeding improved, the practice of bottle-feeding increased between 2006 and 2011. This could be indicative of mothers not having enough time to breastfeed their children. Caregivers, who bottle-feed their children as they have busy schedules, are likely to leave the children with other caregivers who may fail to provide them with sufficiently diverse diets. Cow’s milk, the most common substitute for breast milk, does not contain sufficient iron for children aged 6 to 23 months. Bottle-feeding can also expose these children to diarrhoeal diseases, which in turn contribute to anaemia, wasting and stunting through reduced utilisation of iron by the body.

The study also showed that while the overall quality of complementary feeding improved, the practice of bottle-feeding increased between 2006 and 2011. This could be indicative of mothers not having enough time to breastfeed their children. Caregivers, who bottle-feed their children as they have busy schedules, are likely to leave the children with other caregivers who may fail to provide them with sufficiently diverse diets. Cow’s milk, the most common substitute for breast milk, does not contain sufficient iron for children aged 6 to 23 months. Bottle-feeding can also expose these children to diarrhoeal diseases, which in turn contribute to anaemia, wasting and stunting through reduced utilisation of iron by the body.

**Table 3: Association between child factors and complementary feeding practices in 2006**

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Complementary feeding indicators, n = 2958</th>
<th>Min. acceptable diet</th>
<th>Min. dietary diversity</th>
<th>Min. meal frequency</th>
<th>Bottle-feeding</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>p-value</td>
<td>%</td>
<td>p-value</td>
<td>%</td>
</tr>
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<td>17.8</td>
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<tr>
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<tr>
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<td>29.1</td>
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<tr>
<td>12–17</td>
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<tr>
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<td>61.0</td>
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**Discussion**

This study showed that the proportion of Ugandan children aged 6 to 23 months who consumed a minimally adequate diet increased significantly between 2006 and 2011. However, the proportion remains low. This can be attributed to the failure of the majority of mothers to feed their children complementary diets at least twice a day for children aged 6 to 8 months and three times a day for those aged 9 to 23 months, irrespective of their breastfeeding status. The findings showed that in both 2006 and 2011 children aged 6 to 23 months were consuming foods from four or more food groups, but only a small fraction of them consumed such diets at least twice a day.
complementary feeding improved, the practice of bottle-feeding with cow’s milk, compounded by other caregivers who may fail to provide them with sufficiently diverse diets. Cow’s milk, the most common substitute for breast milk, is often disparaged by caregivers, who believe it inappropriate, as children aged 18 to 23 months perceived them as old enough to eat with the rest of the family during established adult mealtimes. This perception is inaccurate, as children aged 18 to 23 months still need complementary feeding support due to their small appetites and dislike of certain foods.

The study found that children aged 9 to 17 months were more likely to consume complementary diets of four or more food groups at least twice a day than those aged 6 to 8 months and 18 to 23 months. According to the Ugandan Ministry of Health and WHO guidelines, children aged 6 to 9 months should consume diverse diets more than three times a day. But the present study shows that this was not the case in Uganda in 2006 and 2011. Teething, a loss of appetite during teething and weight loss due to increased infections could explain changes in feeding practices among children 6 to 8 months. One plausible explanation for the observation that older children (18 to 23 months) consumed inadequate complementary diets may be the transition from complementary diets to the family’s normal diet. Furthermore, it is likely that mothers of children aged 18 to 23 months perceived them as old enough to eat with the rest of the family during established adult mealtimes. This perception is inappropriate, as children aged 18 to 23 months still need complementary feeding support due to their small appetites and dislike of certain foods.

Table 4: Association between child factors and complementary feeding practices in 2011

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<tr>
<th>Independent variable</th>
<th>Min. acceptable diet</th>
<th>Min. dietary diversity</th>
<th>Min. meal frequency</th>
<th>Bottle-feeding</th>
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<tr>
<td></td>
<td>%</td>
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<td>%</td>
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</tr>
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</tr>
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<td>33.0</td>
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<td>21.5</td>
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<td>24.4</td>
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<td>&lt;0.001</td>
<td>0.065</td>
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<td>25.3</td>
<td>59.7</td>
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<td><strong>Vitamin A past 6 months</strong></td>
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<tr>
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<td>28.8</td>
<td>65.5</td>
<td>40.2</td>
<td>25.7</td>
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</table>
Conclusion

Overall, this study showed an improvement in the proportion of Ugandan children who were fed at least four food groups at least twice a day between 2006 and 2011. The study showed that children aged 6 to 8 months and those aged 12 to 17 months tended to receive adequate complementary diets in both 2006 and 2011. Caregivers who take their children for vaccinations and deworming are more likely to provide more adequate diets than those who do not – at least for the children aged 6 to 17 months. It appears there is a positive and encouraging benefit in the contact between caregivers and healthcare practitioners who provide advice on adequate complementary feeding practices and diets during consultations for child immunisation and deworming. Nationwide efforts to encourage healthcare service providers in postnatal care contact points, such as immunisation clinics, to provide complementary feeding education and counselling to caregivers are likely to improve complementary feeding practices in Uganda. Such efforts will require active provision of immunisation and deworming at both health facilities and community centres so that more caregivers can receive feeding advice from the healthcare service providers. Healthcare workers should actively discourage bottle-feeding and encourage breastfeeding.

Strategies are needed to ensure that all children from 6 to 23 months of age are provided with meals consisting of four or more food groups several times a day. A practical step would be to adjust labour policies so that mothers can spend more time with their children during the work day. Another approach would be to encourage the development of affordable complementary foods to save caregivers time and money in preparing foods for children.
References


Received: 20-09-2015 Accepted: 13-08-2016
WHY IS TOO MUCH SALT BAD FOR YOUR HEALTH?

Eating too much salt leads to high blood pressure:

1. In South Africa, 1 in 3 people 15 years or older have high blood pressure.

   5g =

2. Experts advise that we eat no more than 5g, 1 teaspoon, of salt every day.

3. On average the current salt intake levels in South Africa range from 6 - 11g per day - reaching more than double the recommendation!

High blood pressure can cause a heart attack or a stroke:

- High blood pressure is the leading risk factor for heart attacks and stroke in SA.
- Responsible for 1 in 2 (50%) strokes and 2 in 5 (42%) heart attacks.

Measure your blood pressure

High blood pressure has no symptoms, making it very important to get your blood pressure checked regularly.

More than 50% of people with high blood pressure are unaware they have it.

Have your blood pressure checked today!

REDUCE YOUR SALT INTAKE TO REDUCE YOUR RISK OF HEART DISEASE AND STROKE

For more information contact the Heart and Stroke Foundation South Africa
healthline on 08601 HEART(43278),
email: heart@heartfoundation.co.za
or visit www.heartfoundation.co.za
HOW TO CHANGE YOUR SALTY WAYS

Where does salt in the South African diet come from?

55% Salt from processed food
   - Polony
   - Viennas
   - Bread
   - Crisps
   - Breakfast cereals, etc

5% Salt naturally in food
   - Fruit & vegetables
   - Meat
   - Milk
   - Whole grains, etc

40% Salt added during cooking or at the table

Change your salty ways in 3 simple steps:

1. Choose less salty foods - look for the Heart Mark!
   Cook at home with fresh ingredients.

2. Cook with less salt.
   Use dry herbs, spices, garlic, lemon and chilli for flavour. If you use salty ingredients, don’t add salt too.

3. Do not add salt to prepared food.
   Taste food before adding more salt and better yet, remove salt shaker from the table.

For more information contact the Heart and Stroke Foundation South Africa healthline on 08601 HEART(43278), email: heart@heartfoundation.co.za or visit www.heartfoundation.co.za
Skimmed milk as a determinant of vitamin A deficiency

Colin Musara* and Mudavanhu Nyagura*

*Department of Preclinical Veterinary Studies, University of Zimbabwe, Harare, Zimbabwe
*Corresponding author, email: colmus@vet.uz.ac.zw

Objective: To compare the levels of vitamin A in ultra-high temperature treated (UHT) whole milk (3.5% fat) and UHT skimmed milk (0.5% fat) using UV-visible light spectrophotometry and to compare the contribution of whole milk and skimmed milk to the recommended dietary allowance (RDA) for vitamin A.

Introduction

Amongst all natural foods and beverages milk is unique in that it contains all known water-soluble and fat-soluble vitamins. The fat-soluble vitamins A (retinol), D (1,25 dihydroxycalciferol), E (α-tocopherol) and K (2-methyl-3-phytal-1,4-naphthoquinone) are normally associated with the butterfat content of milk. In addition, butterfat contains β-carotene, which upon ingestion serves as a precursor for synthesis of vitamin A.1 Extraction of butterfat from milk during skimming is therefore expected to result in substantial loss of fat-soluble vitamins. However, the healthy organism is able to synthesise vitamin D beginning with the action of ultraviolet light on cholesterol in the skin. Likewise vitamin K can be obtained from synthetic activities of symbiotic bacteria resident in the colon. Vitamin A and vitamin E, on the other hand, have to be obtained from external sources. A daily serving of 244 ml of cow’s whole milk contributes 7.6% to the recommended dietary allowance for vitamin A and only 1% to the RDA for vitamin E.2 Despite the lesser nutritional contribution, vitamin E in milk helps to slow down peroxidation of lipids and thus enhances the bioavailability of vitamin A as well as other fat-soluble vitamins. According to previous reports, whole milk contains on average 310 μg/L4 of vitamin A (1 IU = 0.3 μg/L). Important seasonal variations have, however, been documented such that the vitamin A content of whole milk ranges between 200 and 480 μg/L.4 Although the above values are expected to be significantly reduced in skimmed milk, public literature is inundated with the health benefits of fat-free milk, as portrayed in advertisements in various newspapers and magazines. A dearth of scientific studies and data overshadows the effects of skimming on the status of fat-soluble vitamins. The objective of the present study was to quantify the reduction in vitamin A content when bovine standardised whole milk (3.5% butterfat) is converted to skimmed milk (0.5% butterfat). Measurements of this nature help in providing a quantitative basis for universal fortification and prevention of vitamin A deficiency diseases in developing nations.

Method

Thirty paired samples of the same brand of UHT (ultra-high temperature treated) whole milk (3.5% butterfat) and UHT skimmed milk (0.5% butterfat) of Zimbabwean origin were randomly acquired from commercial sources. In accordance with the regulations of the country, all milk samples acquired were within the expiry dates of the products i.e. nine months from the date of manufacture. Only milk from light-proof packages was used, to protect vitamin A from oxidation by light.6 No external antioxidant was added to milk samples because whole milk contains on average 800 μg/L7 of vitamin E, which protects against peroxidation of unsaturated double bonds in vitamin A.8 The principles of extracting fat-soluble vitamins from milk for analysis are well established.9 All the reagents used in the vitamin A measurements were of analytical grade. In the current investigation, the first step in determination of fat-soluble vitamin A in the milk samples involved disruption of fat, casein and whey protein by addition of 1.7 ml aliquots of methanol (Fisher Scientific, Loughborough, UK) to 5 ml samples of whole milk and 5 ml samples of skimmed milk, respectively. Next, alkaline saponification was carried out to break down lipid globules in which the fat-soluble vitamins were bound. To this end, 3.3 ml of 10% w/v KOH (Fisher Scientific, Loughborough, UK) were added to the samples, after which they were vortex-mixed for 1 min and placed in a water bath at 70°C for 30 min. The samples were then removed from the water bath and cooled in ice for 10 min. The third step involved extraction of fat-soluble vitamins from the milk. Exactly 1.7 ml of diethyl ether (Sklabs, Johannesburg, South Africa) was added to the samples and vortex-mixed for 1 min. The samples were then centrifuged using a bench centrifuge (Centaur 2, MSE UK Ltd, London, England) at 3 000 rpm/1818 x g for 10 min. Separation yielded a lipophilic supernatant containing the fat-soluble constituents of milk and a bottom aqueous emulsion containing the rest of the milk components. In the fourth and final step, the levels of vitamin A in the supernatant were determined using a UV-visible light spectrophotometer...
vitamin E in milk helps to slow down peroxidation of lipids and fat-soluble vitamins. According to previous reports, whole milk thus enhances the bioavailability of vitamin A as well as other Important seasonal variations have, however, been documented regarding the recommended dietary allowance for vitamin A and only 1% to 3.5% of a serving of 244 ml of cow’s whole milk contributes 7.6% to the RDA for vitamin A. 

The contribution of milk to the RDA for vitamin A was reduced from the standard 7.6% for whole milk to 1.30% for skimmed milk. The 85.7% reduction in butterfat content from 3.5% in whole milk to 0.5% in skimmed milk was accompanied by a 74.6% reduction in vitamin A content relative to whole milk. Therefore, a significant reduction in butterfat content from 3.5% to 0.5% caused loss of milk fat equivalent to 85.714%. Hence the correlation between milk fat content and vitamin A content was 97.28%.

Table 1 shows the actual concentrations of vitamin A in skimmed milk and whole milk as calculated from the optical density of vitamin A in skimmed milk, whole milk and the vitamin A standard. 

**Table 1:** Concentration of vitamin A in skimmed milk compared with whole milk (Mean ± SD)

<table>
<thead>
<tr>
<th>Sample</th>
<th>Concentration of vitamin A (μg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skimmed milk</td>
<td>35.855 ± 0.046</td>
</tr>
<tr>
<td>Whole milk</td>
<td>208.830 ± 0.083</td>
</tr>
</tbody>
</table>

**Discussion**

The present study elucidated a significant reduction of vitamin A in skimmed milk in comparison with whole milk. Milk skimming involves extraction of butterfat from whole milk for the manufacture of butter as well as various kinds of cream. Inevitably, fat-soluble vitamins partitioned in the fat portion of milk were also removed during the skimming process. Therefore, milk skimming results in substantial loss of fat-soluble vitamins. However, the butterfat from milk during skimming is therefore expected to serve as a precursor for synthesis of vitamin A. 

β-carotene, which upon ingestion is converted into vitamin A, is co-published by Medpharm Publications, NISC (Pty) Ltd and Taylor & Francis, and Informa business.

The principles of extracting fat-soluble vitamins from milk for use in biological fluids has been previously described. In the present investigation, 3 ml of the supernatant were transferred from each centrifuge tube to a quartz cuvette and the optical density of vitamin A measured at the wavelength corresponding to the peak absorbance. The absorption spectrum of vitamin A is between 300 and 350 nm, with peak absorbance at 328 nm. The standard was prepared by dissolving 600 μg/L of vitamin A (Norbrook, Newtry, Northern Ireland) in a mixture of methanol and diethyl ether as for the milk samples. The molar extinction coefficient of vitamin A is a fat-soluble and hence certainly absent in pure water. All experiments were carried out in duplicate and the results expressed as mean ± standard deviation (SD). Optical density was converted to vitamin A concentration as follows:

\[
\text{Concentration of vitamin A (μg/L)} = \frac{\text{Optical density of sample/Optical density of standard}}{p} \times \text{Vitamin A concentration (μg/L in standard)}
\]

Modern spectrophotometers are equipped with a photomultiplier that ensures adequate sensitivity of the instrument in the entire UV-visible region of the electromagnetic spectrum. The detection limit of the instrument in the present study was 0.001 absorbance units, equivalent to a vitamin A concentration of 0.213 μg/L. 

The measurements of vitamin A levels in milk were carried out in the Analytical Chemistry Laboratory of the Department of Preclinical Veterinary Studies, Faculty of Veterinary Science, University of Zimbabwe. Two suitably qualified and trained technicians performed the analysis. The coefficient of variation of the extractions and spectrophotometry analyses, as computed from the formula, standard deviation/mean, was 0.276 for skimmed milk compared with 0.084 for whole milk. Thus, sensitivity of UV-visible light spectrophotometry decreased with decreasing vitamin A concentrations. Student’s t-test for comparison of two means was used to test for differences in vitamin A content between whole milk and skimmed milk. The level of significance was set at 95% confidence limits (p < 0.05).

**Results**

In spectrophotometry the concentration of a substance is directly proportional to its optical density, or absorbance. It was thus possible to quantify the loss of vitamin A from whole milk upon skimming by comparing the optical density of the nutrient in whole milk and skimmed milk. In all cases, consistently lower levels were recorded for skimmed milk compared with full cream milk. Figure 1 shows the optical density of vitamin A in skimmed, whole milk and the standard, depicting the reduction in concentration of vitamin A in skimmed milk relative to whole milk.

The average loss of vitamin A from skimmed milk expressed as a percentage of whole milk was 82.824 ± 3.51% as computed from the formula:

\[
\text{Percentage loss of vitamin A} = \frac{\text{Optical density of vitamin A in whole milk} - \text{Optical density of vitamin A in skimmed milk}}{\text{Optical density of vitamin A in whole milk}} \times 100
\]

Figure 1: Mean optical density of vitamin A in skimmed milk with 0.5% fat, whole milk with 3.5% fat and the standard with 600 μg/L of vitamin A.

Table 1: Concentration of vitamin A in skimmed milk compared with whole milk (Mean ± SD)

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The RDA for vitamin A ranges from 400 μg/day in infants below 6 months old, through 700 μg/day for adult females, to 900 μg/day for adult males. Whole milk is a good source of vitamin A.
The physiological functions of vitamin A and its derivatives have been extensively reviewed and are summarised as follows. Retinol is critical in vision. Retinoic acid functions in maintenance of the integrity and innate immunity in epithelia (cornea, respiratory tract, digestive tract and reproductive tract). It is also involved in specific immunity by influencing differentiation of T cells. Other functions of retinoic acid include cell growth and development. With reduction in vitamin A content in skimmed milk, the contribution of milk to the RDA for vitamin A was reduced by well over 80%. Consumption of skimmed milk in poorly resourced settings therefore should be seen as a determinant of poor vitamin A status. In a worldwide survey by the World Health Organisation, 190 million children under the age of five years and 19.1 million pregnant women had biochemical vitamin A deficiency, i.e. low serum retinol concentrations. Of this, 2.55 million children and 3 million expectant mothers suffered from night blindness, an indicator of clinical vitamin A deficiency. Other manifestations of vitamin A deficiency include xerophthalmia, permanent blindness, hyperkeratosis, anaemia and nutritionally acquired immune deficiency. It is clear that any factor that contributes to a reduction in the dietary intake of vitamin A in vulnerable groups is highly undesirable, including plain skimmed milk. Although controlled studies on consumption patterns of skimmed milk in developing countries are lacking, intake of skimmed milk is likely to be higher in women of child-bearing age than other population groups, fuelled by the desire to ‘shed’ weight. As a result, offspring from vitamin A-deficient mothers may be at risk of hypovitaminosis A. Another factor that may increase consumer preference for skimmed milk, particularly among the health-conscious population groups, is the low cholesterol content of the milk.

As shown in Figure 1 vitamin A exists in milk chiefly as retinol. Results from the current investigation affirm that sufficient levels of vitamin A are normally present in whole milk from intake of fresh forages or silages. As in previous studies, variations occurred in concentrations of vitamin A from sample to sample. Absolute concentrations of vitamin A in milk vary according to season, with increased levels in the summer months. Variations in concentrations of vitamin A in milk also occur with diet and with the stage of lactation. In spite of the limitations to the study posed by the diverse sources of variation, the present results fell within the previously reported range of vitamin A concentration in whole milk. The average concentration was marginally lower than reported for whole milk prior to processing, pointing to a possible deleterive effect of ultra-high temperature treatment. The principal limitation of UV-visible light spectrophotometry is that it does not distinguish between two substances that absorb light at identical wavelengths. For this reason, an empirically determined wavelength of 328 nm was used in the spectrophotometric measurements, the validity of which was confirmed from the standard solution of vitamin A. In conclusion, reduction in vitamin A content in skimmed milk relative to whole milk was a consistent finding. This study represents the first scientific report on vitamin A concentrations in skimmed milk. Further studies are clearly essential to fully explore the impact of the depletion, and its consequences on nutrient status, particularly of vitamin A and other fat-soluble vitamins at various levels ofskimming.

Conflict of interest – There is no conflict of interest to declare.

References

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The All-Natural Appetite Booster

The Benefits of Hapenz Syrup’s natural ingredients

- Alpinia galanga is useful in the treatment of loss of appetite, flatulence, vomiting, upper abdominal pain and colic, indigestion and sluggish digestion. 1,2,3,4
- Trikatu helps to treat loss of appetite, flatulence, intestinal colic, indigestion, spasms and stomach ache. 5,6,7,8
- Fennel helps promote weight gain, aids digestion and improves appetite. 9,10,11
- Amla has anti-oxidant properties, and helps treat loss of appetite. 12,13
- Brahmi helps improve intellectual and cognitive functioning, increases learning speed, sharpens concentration, and assists in improving information retention. 14,15,16
- Ashwagandha boosts immunity, improves nutrition and strength of children, and increases appetite and body weight. 17,18,19

SASPEN would like to wish all members well at the start of a new year!

SASPEN is working hard behind the scenes planning various events for 2017.

In SASPEN’s previous news bulletins there have been alerts on the nutritionDay initiative. South Africa has never participated in this initiative. Getting nutritionDay off the ground in South Africa in 2017 is a major focus for SASPEN and ENASA. The first step would be to identify centres that would be interested in participating and to get ethics approval for participation. To learn more about nutritionDay please visit www.nutritionday.org. If you are interested in participating please contact a SASPEN representative. There will be further communication through our social media platforms for nutritionDay 2017.

SASPEN is proud to announce that it will be joining the Critical Care Society of Southern Africa (CCSSA) again this year in Sun City. The congress will take place from 19–22 October 2017. The theme of this years’ congress is “Precision medicine”. SASPEN is taking part with a programme themed “Hitting the bull’s eye with nutrition in ICU”. The program is focusing on diverse patient populations in ICU. We look forward to a program addressing disease specific nutrition and spicing things up with debates around ICU requirements and round-table discussions with international experts.

SASPEN, together with ENASA, is also excited to facilitate the Life Long Learning (LLL) program at this congress. We look forward to welcoming the different role-players in nutrition to the LLL and spreading the knowledge and understanding of nutrition in the ICU. Keep an eye on our social media platforms for more information as it unfolds. You can visit the congress webpage at www.criticalcare.org.za/CSSA17.

SASPEN is again offering members the opportunity to become an ESPEN member at a reduced rate through block membership. If you are interested please contact us via email at info@saspen.com.

SASPEN will be taking part again in the various nutrition events throughout 2017. We would also like to hear about your initiatives and plans. Please like us on Facebook, follow us on Twitter and join us on LinkedIn to stay informed about events and opportunities. You can visit our webpage on www.saspen.com or download our SASPEN application on your smart devices.
Are we making progress with South Africa’s salt reduction strategy?

On 2 September 2016, Ali Dhansay represented the Nutrition Society of South Africa (NSSA) at a multi-sectoral meeting hosted by the Heart and Stroke Foundation South Africa (HSFSA) to discuss progress, challenges and the way forward for South Africa’s (SA) salt reduction strategy.

Participants acknowledged that SA is playing a leading role in salt reduction globally, but that effective monitoring is key to assess the impact of the salt legislation on salt intake and related health outcomes.

Jacqui Webster, Director of the WHO Collaborating Centre on Population Salt Reduction at the George Institute for Global Health, Australia, presented on the effectiveness of salt reduction programmes globally and confirmed that there is adequate evidence to support the need to reduce salt in order to increase positive health outcomes. SA’s salt reduction policy could potentially reduce 11% of deaths from heart disease per year and result in approximately R 713 million savings in healthcare costs per year.

Karen Charlton from the University of Wollongong, Australia, and Bianca Swanepoel from North-West University, presented new data on salt intake indicating that South Africans are consuming salt in excess of the World Health Organisation’s recommended 5 g per day. The data confirm previous salt intake estimations and provide further support for the government’s salt reduction strategy.

Five priority areas were identified as a roadmap for salt reduction for 2017 and beyond. First of these was the need to support industry compliance with the existing legislation and increase efforts to prepare for the 2019 legislative thresholds. The second was to identify the contribution to salt intake of foods eaten outside the home and developing an appropriate strategy to address this issue. The third priority was implementing the next stage of the Salt Watch public education and awareness campaign to influence consumer behaviours. Key messages should be identified that could be integrated into broader health communication strategies, for example, the Food-based Dietary Guidelines. The fourth priority was ensuring that salt reduction efforts do not inadvertently widen health inequalities based on affordability. Lastly, additional funds are required for research and monitoring in order to build capacity to continue to monitor changes in salt intake and salt-related behaviours. This may include integration of salt intake monitoring into national surveys and identifying opportunities to measure children’s salt intake.

The SA legislation to limit salt levels in processed foods, combined with public health education, is an example of what a steadfast government can do to improve health at a population level. The NSSA remains committed to support government and the HSFSA in taking the global lead in salt reduction.

For the full report contact gabriel@heartfoundation.co.za

Erratum - NSSA Junior Scientist Awards, Nutrition Congress 2016

In the previous issue of the SAJCN the names of the awardees of the NSSA Junior Scientist Awards were unfortunately switched around.

During the Nutrition Congress that was held in Somerset West, 3–5 September 2016, the Nutrition Society Award given to a junior scientist for the best oral presentation was presented to Mariana Wicks for her paper Comparing food classification of various nutrient profiling models to the opinions of South African dietitians. Marinka van der Hoeven was the runner-up and received the second prize for her paper Consumption of locally produced foods in South Africa; a qualitative inquiry of women’s perceptions.
Sugar tax

From April 2017, a tax on sugar-sweetened beverages (SSBs) will be introduced in South Africa to help reduce excessive sugar intake in the South African population. ADSA acknowledges that many South Africans are at a greater health risk due to the high consumption of free/added sugars and is in support of the proposed taxation of SSBs. Further, it is ADSA's position that there is a need for multiple additional interventions across multiple sectors to improve the population's diet, address undernutrition and protect against overweight, obesity and non-communicable diseases.

It is ADSA's view that, while a tax on SSBs has the potential to reduce the consumption of free/added sugars and improve obesity, a tax on SSBs must be viewed as only one piece of the puzzle to address the complex problem of obesity in South Africa, and the other forms of malnutrition. Education around healthy choices and the creating of an enabling environment to make those choices easier for the public will still need to be a priority for all South Africans. In addition to reducing the consumption of SSBs to prevent obesity and promote long-term health, ADSA continues to recommend a healthy diet which includes whole grains, fruit, vegetables, nuts, legumes, healthy oils, proteins such as lean meats and seafood, and a reduced intake of processed meats and salt, accompanied by regular physical activity.


ADSA’S biannual national roadshow

The ADSA National Roadshow has taken place at most branches across the country and will continue at the remaining branches in the early part of 2017. ADSA's Representation portfolio holder, Alpha Rasekhala, has visited branches to present on the HPCSA's regulations and policies on ethical and professional conduct for practitioners. The Roadshow has helped dietitians become more familiar with the detailed regulations and policies, and has identified important points for all practising dietitians to consider in their everyday working practices. We thank Alpha for all his time and hard work that has helped make the Roadshow a great success.

Feedback from the public relations portfolio

ADSA continues to be busy in the public relations (PR) domain, responding to regular media requests as well as creating content to promote the profession and ensuring sound nutrition advice is made available to the public. During the past six months, the PR team has disseminated seven media releases, and generated a wide range of media coverage for ADSA, reaching an estimated potential audience of over 32 million individuals through a variety of channels, including print and online media, as well as radio and television. ADSA's Facebook page and Twitter following continue to grow, and the Facebook page reaches an average of over 31 000 readers each month.

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- Blog: http://nutritionconfidence.wordpress.com
- Website: http://www.adsa.org.za
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