



Nestlé Foundation

for the Study of Problems
of Nutrition in the World

Annual Report 2003

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President's message

One of the main objectives of the Nestlé Foundation is to help scientists from developing countries to establish their own priorities regarding human nutrition research. In countries where malnutrition is prevalent, it is preferable for local scientists to carry out well-designed nutrition research programs themselves. To attain this goal, these scientists not only need financial resources, but also adequate scientific and technical support. It is important for them to identify the specific nutritional needs of the populations at risk and to design the best strategy to meet their requirements. The active participation of these scientists should help to promote sustainability of programs aiming at fighting malnutrition.

The Nestlé Foundation offers training in nutrition research to promising young staff members of selected institutes, in order to strengthen the research capacity of nutrition units in low-income countries. We also support postgraduate courses in human nutrition in Africa (in Senegal and Uganda) to improve the nutrition knowledge of health professionals. This proactive policy has resulted in an increase in the number of research projects submitted to the Foundation by local scientists of developing countries. Thus, research projects in Bangladesh, China, Columbia, Ghana, India, Indonesia, Kenya, Lebanon, Mali, Peru, Senegal, South Africa, Thailand, Uganda and Vietnam are currently being carried out mainly by local scientists, with the advice, when needed, of scientists from developed countries. This heartening achievement is also a follow up of an institutional capacity-building workshop that we organized in Vevey in April 2002. For this occasion, we invited 15 nutrition institute directors from Africa, Asia and South America to encourage them to work with the Foundation on problems of malnutrition in their countries. Many participants of this workshop sent us grant applications that were accepted for funding. A unique role of the Nestlé Foundation is the assistance that we provide to the applicants to improve the quality of their research projects. This is possible thanks to the competence and the dedication of Council members, scientific advisors and the great input of the Director. There are many scientific and technical supports that we provide to the local scientists. Thus, our Foundation is more than a simple grant-giving body; it plays an active role in the design and implementation of many nutritional studies that we support financially.

In March 2003, we nominated a new Director to succeed the late Dr. Beat Schürch. Dr. Paolo Suter, Privat-docent at the Faculty of Medicine of the University of Zürich was elected as the new Director of the Foundation. Dr. Suter works part time as Director of the Nestlé Foundation and part time as head of a unit at the University Medical Policlinic in Zürich. In doing this, he is able to keep an active contact with both patients and the academic world. Dr. Suter is an expert in human nutrition. He spent several years as a research

scientist at Tufts University in Boston, where he was particularly interested in the nutrition problems of the elderly as well as the role of nutrition in the prevention of chronic diseases. He has recently published a book on clinical nutrition for physicians and medical students. With this new Director, the Nestlé Foundation will pay even more attention than before to the public health implication of the research projects that we support. Dr. Suter has also identified an important lack of information transfer in the area of nutrition to scientists of developing countries. In order to fill this gap, he is building an electronic library that provides access to the major nutrition journals free of charge, as well as other important sources of nutrition information to scientists from developing countries. Dr. Suter also plans to promote the use of better vehicles for complementary/ supplementary feeding of micronutrients to at risk populations, such as young infants and women of childbearing age.

I would like to thank the Council members, the Foundation's experts, the Director Dr. Paolo Suter and his Assistant Dr. Elisabeth Müller, for their dedication and their numerous contributions to the activities of the Foundation. I also express my gratitude to Mr. Peter Brabeck, the Chief Executive of the founding company, to Mr. Luis Cantarell, Director and to Professor Wolf Endres for their personal interest and support in our activities.

A handwritten signature in black ink, appearing to read "E. Jéquier". The signature is fluid and cursive, with a large, sweeping initial "E" and a long, horizontal flourish at the end.

General information on the Nestlé Foundation

1. Origin and nature

The Nestlé Foundation for the study of problems of nutrition in the world was established in 1966 by the Nestlé Company on the occasion of its centenary. It operates as an independent organization whose office is in Lausanne, Switzerland.

2. Purpose

The Nestlé Foundation initiates and supports research in human nutrition with public health relevance in low- and lower middle-income countries.

3. Current policy

At present the Foundation's work is primarily concerned with physiological and behavioral problems resulting from or affected by (1) macro- and micronutrient deficiencies and imbalances, (2) interactions between nutrition, immune defense and infection, (3) malnutrition and related factors during fetal life and infancy producing effects on various parameters of infant and child health, growth and development, as well as chronic diseases in adulthood, (4) malnutrition and genetic polymorphism. Studies in other areas of human nutrition research might also be considered, as long as they are dealing with problems of malnutrition in low- and lower middle-income countries according to recent World Bank classification, subsequently referred to as target countries. Funded projects are usually of one- to three-year duration.

One of the Foundation's main aims is the transfer of scientific and technological knowledge to target countries, and most Foundation-

sponsored research projects are realized in collaboration with scientists at universities and research institutes in such countries. Research grant applications from high-income countries are only considered if they propose a project in a target country, with strong involvement of local scientists in all phases of the project.

The Foundation does not normally fund: (1) experiments in vitro and on animals; (2) research on food policy, food production and food technology; and (3) nutrition surveys.

4. Application procedures

Interested scientists should first submit a letter of intent in which they describe very briefly the kind of project they would like to undertake including an estimate of required funds. If that project is compatible with the Foundation's current funding policy, applicants will receive guidelines on how to submit a detailed proposal.

Research grant applications are evaluated twice a year by the Foundation's Council, a group of independent scientists. Decisions on funding are based on the scientific quality and practical importance of the project. Deadlines for submission are January 10 and May 10.

5. International Fellowship Program

This program is intended to develop and strengthen the research capacity of selected nutrition units in low-income countries. The Nestlé Foundation welcomes inquiries and/or applications from institutions wishing to benefit from this program. It currently does not accept spontaneous individual applications for scholarships, fellowships or travel grants.

Activities in 2003

1. Research projects

In 2003, the Council decided to fund the 9 research projects that are described below.

1.1. Micronutrient deficiencies

1.1.1. Zinc homeostasis in- & zinc requirements of- young chinese children

Xiaoyang Sheng

Xin Hua Hospital, Shanghai Second Medical University, Shanghai (People's Republic of China) and Section of Nutrition, Department of Paediatrics, University of Colorado Health Science Center, Denver (USA)

USD 65,000

Zinc plays a central role in health maintenance as a constituent of many metalloenzymes. Zinc deficiency is widespread and poor bioavailability of zinc from different plant food sources plays an important role as a determinant of the zinc status. The principal hypotheses to be tested are that toddlers in rural Ningxia Municipality, whose dietary staples are breast milk and grains (i.e. high phytate intake leading to an impaired zinc bioavailability) have higher dietary zinc requirements than toddlers of the same age and sex in Shanghai and at least a fourfold higher percentage of individuals whose zinc intake does not meet these requirements. This hypothesis can be answered by applying zinc stable isotope techniques to estimate: average zinc requirements (EARs); the effect of differences in bioavailability of dietary zinc on these requirements and the magnitude of the deficits in dietary zinc that require correction. Key variables of zinc homeostasis to be measured are dietary zinc intake

[TDZ]; fractional [FAZ] and total [TAZ] absorption of zinc; endogenous faecal [EFZ] and urine [UZ] zinc. A dual isotope tracer ratio method based on urine enrichment (days 3 to 8) will be used to determine FAZ.

1.1.2. The effect of zinc supplementation and its interaction with vitamin A on child immune responses and morbidity rate

Martha Irene Kartasurya et al.

Devision of International Health, School of Public Health, University of Queensland, Brisbane (Australia) and Medical Faculty, Diponegoro University, Dr. Kariadi Teaching Hospital, Semarang (Indonesia)

USD 163,624

This study investigates the effect of zinc supplementation on respiratory morbidity on preschool children who receive routine vitamin A supplementation every six months under a national control program. In addition, the synergistic effect of vitamin A and zinc on immune responses should be addressed. The study is a double blind randomized controlled supplementation trial. A total of 770 preschool children aged 2-5 years who live in the study area will be recruited and randomly assigned to zinc or placebo glucose syrup regimen for four months. Zinc/placebo supplementation will start four months after the routine vitamin A administration, when vitamin A status will be approaching pre-supplementation levels and will continue through until two months following the next round of routine vitamin A administration. The primary end points are morbidity rate differences between the zinc and placebo groups that will be compared to examine the effect of zinc supplementation on respiratory morbidity. Further comparison of immune response measures amongst zinc/ placebo sub-groups both before and after vitamin A supplementation will be used to examine the independent effect of zinc, vitamin A and their interaction on immune responses. The vitamin A and zinc status of the children will be measured. Hair samples will be collected for the determination of hair zinc level. The blood samples will be used for measuring vitamin A status, zinc status, different inflammatory as well as immunological markers.

1.1.3. The usefulness of ferrous fumarate and ferric pyrophosphate as food fortificants for infants and young children in developing countries

Lena Davidsson et al.

Laboratory for Human Nutrition, Swiss Federal Institute of Technology, R schlikon (Switzerland), International Center for Diarrhoeal Disease Research, Dhaka (Bangladesh) and Kansas University Medical Center, Department of Medicine, Kansas City, Kansas (USA)

USD 107,570

Iron fortification of food represents a central strategy to control iron deficiency. The specific aim of this study is to evaluate the efficacy of ferrous fumarate and ferric pyrophosphate, as compared to ferrous sulphate, as food fortificants in infants/young Bangladeshi children. The different compounds will be compared with ferrous sulphate during a nine month feeding trial. Haemoglobin and indicators of Fe status (ferritin and circulating transferrin receptor) and an acute phase reactant (C-reactive protein) will be monitored at baseline and after 4½ and 9 months of intervention. Infections (hookworm) will be treated pharmacologically. The results may help to identify the usefulness of the different iron compounds for small children.

1.1.4. Evaluation of valid biomarkers to distinguish between iron deficiency anemia and anemia of inflammation in areas of high rates of parasite infestation and nutritional deficiencies

Mohamed Ag Ayoya

Malian Center for Medical Research, Bamako (Mali) and Division of Nutritional Sciences, Cornell University, Ithaca, N.Y. (USA)

USD 116,167

Commonly used laboratory measurements cannot distinguish clearly between iron deficiency anemia (IDA) and anemia of infections or chronic diseases (AI). The aim of the study is to assess the role of hepcidin, alone or in combination with other biochemical parameters in differentiating between IDA and AI. Randomly selected anemic children between 7 and 12 years old (Hb < 115 g/L) will be studied. The iron status and inflammatory status will be evaluated by routine biochemical methods and parasite status will be assessed by examining blood, urine and stools, as appropriate. All children will be treated with chloroquine against malaria throughout the study period and with anthelmintics to cure those with parasites and keep those without parasites uninfected following baseline evaluation. The children will be grouped depending on whether or not they have an infection/inflammation. Additionally, twenty-four hour urinary hepcidin output, plasma retinol, red cell folate, and serum B12 will be measured. The children will be followed for 4 months (monthly blood tests). The results will have important diagnostic implications in the implementation of improved prevention and treatment strategies for enhancing child health in places where IDA and AI very often coexist.

1. 2. Bone health

1.2.1. Heritability, nutrition and adolescent bone health

- Genetic and nutritional factors as determinants of BMD in adolescents and their impact on BMD response to vitamin D supplementation

- Heritability, nutrition and adolescent bone health (Maternal-Sibship Resemblance – Spin-off project)

Ghada El-Hajj Fuleihan et al.

American University of Beirut, Beirut (Lebanon) and MRC Environmental Epidemiology Unit, University of Southampton, Southampton (Great Britain)

USD 74,750 (Programming Study USD 38,000, Maternal Sibship Study USD 36,750)

The purpose of this study is to evaluate the relationship between nutritional variables during pregnancy, at birth, and in the first year of life and bone density in children and adolescents. There are two parts to the study: 1) a so-called Programming Project and 2) Maternal-Sibship Project. The Programming Project serves to evaluate how nutrition in infancy interacts with nutrition during childhood/adolescence, including vitamin D supplementation, in influencing musculoskeletal development (BMD and muscle mass). This project will provide essential information on the interaction between nutrition and genetics and their effect on musculoskeletal development in an area of the world where substantial vitamin D deficiency is prevalent. The Maternal-Sibship Project will evaluate heritability of BMD in this study population, and investigate the impact of vitamin D status on expression of such genetic potential. In addition, the timing of the expression of familial resemblance in bone mass in the study sample will be determined by gender and time of puberty. Both projects are spin-offs from the main study- also backed by the Nestlé Foundation (approved for funding in 2001) – which is a large randomized and controlled trial to evaluate the efficacy of vitamin D supplementation in improving musculoskeletal parameters in children and adolescents.

1.3. Infant and child nutrition

1.3.1. Comparison of the efficacy and acceptability of three types of micro-nutrient supplements added to complementary foods for infants in Ghana

Anna Lartey et al.

Department of Nutrition and Food Science, University of Ghana, Legon – Accra (Ghana) and Department of Nutrition, University of California, Davis, California (USA)

USD 200,000

In this randomized controlled study, the effects of three options of multiple micronutrient supplements (the “food-let” (UNICEF), “sprinkles”, and a fat-based product (“Nutributter”; Nutriset, France)) on the growth and micronutrient status of 400 breast-fed infants (aged 6–12 months) in Ghana will be studied and compared. In addition,

the relative acceptability of the three approaches will be assessed. Anthropometric status of infants in the intervention groups will be assessed at six, nine and twelve months old. Morbidity, dietary intake, and compliance with the recommended supplement use will be assessed weekly. Blood indices will be assessed at six and twelve months old (haemoglobin, ferritin, transferrin receptor, zinc, vitamins A and B-6, riboflavin, and fatty acids; C-reactive protein will be measured as an index of concurrent infection). The efficacy of the different approaches will be compared.

1.3.2. A school-based nutrition intervention pilot project

Dien N. Le et al.

The Nutrition Center, Ho Chi Minh City (Vietnam)

USD 37,900

In this study, the impact of a school-based nutrition education program or a milk supplement (200ml whole milk every day for 32 weeks) on the nutritional status, educational achievement and school attendance of fourth graders (9–11 years old) will be studied. These children are mostly from low-income to middle-income families in three suburban elementary schools in Ho Chi Minh City (HCMC) province. The nutrition education component consists of at least a 30-minute nutrition education session every week in the classroom for students over a period of 32 weeks (total 16 hours) covering eight nutrition education modules; 32 hours for classroom teachers and school-food service employees and 4 hours for parents. The nutritional status of these children will be determined by anthropometric measurements, 24-hour dietary intakes and eating habits and behaviours, at baseline and at the end of the survey. In addition, the data of educational achievement and school attendance of these children will be collected from the manuscript and class records to evaluate the program. It is believed that there will be an improvement in nutritional status, educational achievement and school attendance of school children in the intervention schools after one year.

1.3.3. Evaluation of two counselling strategies to improve exclusive breast-feeding rates among mothers in Kibera slum of Nairobi, Kenya: A randomized clinical trial

Sophie A. Ochola

Department of Nutrition, Kenyatta University, Nairobi (Kenya)

USD 19,893

The high impact of breastfeeding, including lower infant morbidity and mortality from diarrhoea and respiratory infections, is well known. The benefits of breastfeeding increase with exclusiveness of breastfeeding. However, exclusive breastfeeding is uncommon in the sub-Saharan Africa despite high breastfeeding initiation and du-

ration as well as efforts to improve breastfeeding practices. Community-based breastfeeding counselling strategies may offer an alternative to or complement hospital-based initiatives in improving breastfeeding rates. The aim of the proposed study is to test the impact of a modified version of the concept of community-based and a one-on-one facility-based breastfeeding counselling strategies in improving exclusive breastfeeding. The rates of exclusive breastfeeding during the first six postnatal months are rather low in certain areas of the world (also in Kenya). One experimental group will receive one-on-one counselling at the Ante Natal Clinic (ANC), while the second group will receive intensive community-based counselling. Mothers will be enrolled in the study at ≥ 32 weeks of pregnancy and followed until their children are six months old. Measurement of breastfeeding practices will be determined through interviews and observations of a 10% sub-sample to verify the reported information.

1.4. Epidemiologic transition

1.4.1. Assessing physical activity of obese children by a clinical score

Claude Godard

Unidad de Endocrinología Infantil, Instituto de Nutrición y Tecnología de Alimentos (INTA), Universidad de Chile, Santiago (Chile)

USD 16,400

Physical activity plays a central role in the pathogenesis of overweight and obesity. A simple clinical score was developed in the Child Obesity Program of INTA. The present study aims to establish the accuracy of this score (reliability and validity). Further, the hypothesis that the score correlates well with an objective measurement of PA such as triaxial accelerometry and that it, or part of it, discriminates between obese and non-obese children should be tested.

2. International Fellowship Program

In 1991, the Nestlé Foundation International Fellowship Program in Human Nutrition Research replaced the Foundation's former study grant program. The aim of this program is to strengthen the research capacity of nutrition units in low-income countries by offering training in nutrition research to several of their staff members.

From Autumn 2003 until Spring 2004, Mr Rim Hui Yong and Mr. Sim Pong Chol – both medical doctors – from the Democratic People's Republic of North Korea, worked and studied at Mahidol University in Thailand to be acquainted with the basic knowledge in nutri-

tion research. An individual teaching program, including fieldwork, was organized for the two doctors. We hope that this educational fellowship at Mahidol University will lead to increased research efforts in the area of human nutrition in North Korea.

In 2002 and 2003, the Council decided to award fellowships to some of the staff members of the Department of Nutrition and Food Sciences, Abomey Calavi University, Cotonou (Benin). In January 2004, Prof. E. Jéquier and PD Dr. Paolo M. Suter had a site visit at the Department of Nutrition and Food Sciences of the University of Benin in Abomey Calavi. Based on this visit an institutional support plan will be elaborated.

3. Other activities of capacity building

One of the major aims of the Foundation is capacity building in the area of human nutrition in low-income countries. Therefore the Nestlé Foundation provided financial support to two MSc courses taking place in two African Universities. Dr. Joyce Kikafunda from Makerere University in Kampala and Dr. Salimata Wade from Cheikh Anta Diop University in Dakar will report on these courses in this annual report. We also asked Dr. Romain Dossa from the University of Abomey-Calavi in Cotonou (Benin) to write a contribution on another nutrition course offered by an African University.

The Foundation continued to support the African Nutrition Leadership Program allowing 4 fellows to attend the 2003 edition of this program.

Most scientific journals and other publications are published in high-income countries. To enhance the potential for the development of research activities in low-income countries a local publication can contribute considerably to capacity building. Accordingly, the Nestlé Foundation supports each issue of the African Journal of Food, Agriculture, Nutrition and Development (AJFAND) to defray some of the printing costs of this journal. The first issue of this journal was launched in August 2001. The Editor-In-Chief is Hon. Prof. Dr. Ruth Oniang'o. On the web page of the AJFAND, it states that this journal represents a response to a need for a forum that can adequately address Africa's recurrent problems of poverty, food insecurity, non-performing economies, increasing disease threats and environmental degradation. The Foundation thinks that the AJFAND has a high potential for addressing Africa specific challenges in the area of nutrition as well as health maintenance in general. The editorial offices of the journal are in Nairobi, Kenya (www.ajfand.net)

4. www.enLINK.org – an initiative of the Nestlé Foundation

One of the central items in the portfolio of the Foundation is the transfer of scientific and technological knowledge to low-income countries. The Foundation therefore mainly supports research projects in which scientists from such countries play a major role. Surprisingly a critical analysis of the origin of the research grant applications revealed that a majority of them come from high-income countries and not, as expected, from low-income countries.

There are probably many reasons for the latter finding; however, one of the main reasons for the low rate of applications from low-income countries is the lack of knowledge and skills for the writing of an acceptable grant application. This is due to the inability of these researchers to access up-to-date scientific information. In low-income countries there is not only a lack of internet connectivity, but also most institutions do not have the money to subscribe to scientific journals.

Despite the enormous developments in information technology, the knowledge divide between the high- and low-income countries increases. A few facts might illustrate this using some data concerning the digital divide:

- the USA has more computers than the rest of the world combined
- 41% of the global online population is in the US and Canada
- Only 4% of the world's online population is in South America
- Africa: 1 user for every 250 to 400 people (compared to a world average of 1:15, North America and Europe average 1:2)

Due to the low economic development in many areas of Africa, the low availability of the internet and other IT resources is not surprising; however, it is nevertheless surprising that many universities hardly have access to the modern computer-based information resources. Even medical faculties or libraries of large hospital centres are not subscribed to any scientific journal. This is the result of budget constraints. In addition, in the developed world, the subscription to medical and scientific journals is getting more expensive and the subscription rate of a journal corresponds to the monthly income of a medical doctor in many developing countries. Several international organizations (WHO or FAO) have constructed internet sites offering affordable full text access of over 2,000 scientific journals. These databases are an important initiative; however, they have several handicaps for the users, so that the expected success of these electronic libraries has not yet occurred. In addition, it is surprising to see that some of the key nutrition journals are lacking in these journal collections.

Accordingly, the Nestlé Foundation decided to build a digital library for nutrition and nutrition research. In May 2004, enLINK (elec-

tronic nutrition link), the digital library of the Nestlé Foundation, was launched. enLINK is a concerted action between OVID technologies, a selection of very motivated publishers and the Nestlé Foundation.

In most large libraries, including the different digital libraries of some international organizations, the user gets lost due to the vast amount of information on offer. This is especially the case for non-experienced and less focused users.

enLINK focuses on the key journals of human nutrition and thus guides the users automatically. Further, the library is small and flexible, so that new information can be uploaded easily and regularly. At present, the library contains 11 scientific journals (see table 1). All these journals are searchable and registered users can have full access to all new articles and even back issues. In addition, a search engine allows access to all Lippincott Williams Wilkins (LWW) journals and corresponding abstracts. An important additional information source is a core list of important internet links and resources in human nutrition.

enLINK is the only electronic library worldwide that offers this kind of information to scientists in low-income countries. Although the library was launched only at the beginning of May 2004, the international feedback is already overwhelming.

Table 1. Journals available on enLINK as of May 1, 2004

Journal title	Publisher
American Journal of Clinical Nutrition	American Society of Clinical Nutrition
Annual Review of Nutrition	Annual Review Inc.
Asia Pacific Journal of Clinical Nutrition	HEC Press
British Journal of Nutrition	CABI Publishing
Journal of Nutrition	American Society of Nutritional Sciences
Journal of Paediatric Gastroenterology and Nutrition	Lippincott Williams Wilkins
Nutrition Research Reviews	CABI Publishing
Nutrition Today	Lippincott Williams Wilkins
Nutrition Reviews	International Life Science Institute
Public Health Nutrition	CABI Publishing
Proceedings of the Nutrition Society	CABI Publishing

Important issues around enLINK are:

- Full text access is only available to registered researchers in human nutrition from low income countries. Students are not eligible.
- An application form for registration can be obtained and submitted at www.enLINK.org
- It is obvious that not all applications can be accepted. Important criteria for acceptability of the registration are:
 - the country where the application comes from
 - the CV of the applicant – the applicant must be actively involved in human nutrition research
 - the characteristics of the academic affiliation (e.g. availability of institutional support and library services, general infrastructure)

At this time, we would like to express our sincerest thanks to the publishers participating in this initiative. It has to be recognized that without the help and assistance of these publishers offering affordable electronic access to their journals, this project would have not been possible. We hope that these outstanding publishers, who have been participating in enLINK from the very first minute, are going to create a positive momentum for other publishers and institutions to join the enLINK initiative.

Finally, yet importantly, we would like to express our sincerest thanks to OVID technologies and LWW for their collaboration in the construction of this important hosting platform.

enLINK is small but beautiful.

The best way to experience the high potential of enLINK for capacity building is to visit www.enLINK.org.

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Individual contributions

Postgraduate training in human nutrition in Uganda: Master of Science (MSc) in Applied Human Nutrition at Makerere University, Kampala

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Makerere University is one of the oldest and most famous universities in Africa. For many years, it was referred to as the “Harvard of Africa” due to its excellent academic programmes. The social and economic turmoil of the 70s and early 80s left the great institution bent but not broken. The University has now regained most of its past glory and is now a dynamic institution with several faculties, schools, institutes, centres and over 100 departments in all areas of science, technology and the humanities.

1. Department of Food Science and Technology

The Department of Food Science and Technology was established 15 years ago in the Faculty of Agriculture with a mandate of producing human resources to develop the young food industry and to improve the food and nutrition security of the people of Uganda and the region. The Department is a leading centre for training and research in the areas of food science and food technology with a large number of highly trained scientists. The Department offers an undergraduate degree (BSc) and a postgraduate degree (MSc), both in Food Science and Technology. Over 400 graduates have been released into the job market since the start of the Department. Recently, it became clear that there was a great need to produce human resources to address the high levels of malnutrition in the country and other nutrition-related issues. In collaboration with Oxford Brookes University in the UK and under the guidance of Professor Jeya Henry, the Department of Food Science and Technology developed a Master of Science degree in Applied Human Nutrition, the first ever postgraduate programme in human nutrition, in Uganda.

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2. MSc in Applied Human Nutrition at Makerere University

2.1. Background

Malnutrition is one of the most important health and welfare problems among infants and young children in Sub-Saharan Africa, including Uganda. Over the years, health and nutrition reports have persistently found high levels of under-nutrition among Ugandan children. The recent Demographic and Health Survey report found the levels of Protein Energy Malnutrition (PEM) among under-five year old children unacceptably high with 39% stunted, 23% under-weight and 4% wasted (Uganda Demographic and Health Survey, 2000/01). Levels of micro-nutrient malnutrition, particularly vitamin A deficiency (VAD), iron deficiency anaemia (IDA) and iodine deficiency disorders (IDD) affect almost half of the under-five year olds in Uganda. Diet related chronic non-communicable diseases such as hypertension, diabetes and coronary heart diseases are also on the increase, particularly in urban communities.

In recent years, it has become increasingly clear that reductions in the prevalence of malnutrition and improvement in the health and quality of life of people in developing countries can be accelerated significantly through more effectively designed and managed nutrition programmes. This requires a highly skilled professional able to assess the situation, design and implement appropriate interventions in addition to advising policymakers on nutrition related issues. Sadly, Uganda, like many of the countries in Sub-Saharan Africa, lacks a core mass of these highly skilled professionals.

It was against the above background that the Department of Food Science and Technology developed a postgraduate programme in human nutrition to better address nutrition issues and problems in the country. The Master of Science in Applied Human Nutrition programme will produce much needed human resources who can address the nutritional problems facing the vulnerable groups through nutritional education and training, relevant research, advocacy and applied nutrition programmes both at national and community levels. The programme is based on the recognition that there is a great need for the development of research capacity for the advancement of food and nutrition security in Uganda. The programme runs for a period of two years, with the first year being devoted to course work and development of a research proposal, while the second year is devoted to conducting research in a selected field of study under the guidance of two academic supervisors.

2.2. Some unique features of the programme

- The programme provides a venue for specialisation in human nutrition issues not only for Uganda but also for the region

- This postgraduate programme provides an opportunity for candidates, with diverse backgrounds, who are interested in pursuing training and research in human nutrition at postgraduate level. Candidates with medical, natural, biological and social science backgrounds are all eligible for the programme
- Human resources for teaching undergraduate programmes in nutrition and related disciplines will be built through this programme
- The food industries have a need for well qualified nutrition scientists to help them in producing healthy, nutritious foods
- In addition to fresh graduates, this programme welcomes mid-career professionals and enables them to update and expand their knowledge and skills in nutrition and nutrition related disciplines
- The graduates of this programme will promote health through nutrition education, coordination/initiation of nutrition programmes and offer personal consultations
- The programme is in line with top Government priorities of improving people's quality of life through poverty eradication and improvement of their food and nutrition security

2.3. Aim and objectives of the programme

The overall aim of the programme is to develop human resources with the capacity to improve the nutritional situation of the people in Uganda and the region in order to meet the challenges of poverty alleviation, good health, improved livelihoods and sustainable development. Specifically, the programme aims to:

- Equip graduates of the programme with advanced knowledge and skills in all aspects of applied human nutrition
- Enable graduates to develop proficiency in the research of various disciplines of nutrition and apply research principles and methods to the examination of current problems in nutrition
- Provide an opportunity to scientists of diverse backgrounds and medical personnel to do postgraduate research in human nutrition
- Produce an elite of nutrition professionals capable of providing a leadership role in nutrition, health and development programmes at all levels: community, national and regional
- Enable graduates to apply nutrition principles to promote health and the prevention of diet-related disease conditions
- Produce graduates with knowledge and skills to enable them to integrate, analyse and synthesise all the multidisciplinary elements of nutrition and come up with sustainable approaches for the solution of the nutrition problems
- Produce professionals who are able to advocate for nutrition in Government, donor and international agencies in order to put nutrition on the National Development Agenda

2.4. Target group and employment opportunities

The MSc in Applied Human Nutrition targets interested graduates from a wide range of educational backgrounds and working experiences. Candidates are expected to come from both the Government and the Private Sectors such as ministries, organisations, universities and other institutions of higher learning, hospitals and other health units, industry, international agencies, CBOs (community-based organizations) and NGOs. Candidates from regional and international universities are also welcome. Graduates of the Applied Human Nutrition programme can be employed as community nutrition extension specialists, public health nutritionists, nutritional advisors and councillors, nutrition programme planners and implementers and nutrition trainers in any of the above institutions.

2.5. Courses

Core courses	Elective courses
Graduate Seminars	Community & Public Health Nutrition
Applied Statistics & Research Methods	Nutrition Education and Advocacy
Nutritional Biochemistry	Food Chemistry & Food Analysis
Nutrition in Health and Disease	Food Safety and Quality Assurance
Nutritional Epidemiology	Food Processing and Preservation
Applied Nutrition & the Human Life Cycle	Food & Nutrition Business Management
Field Attachment	Nutrition Anthropology
	Nutrition in Emergencies
	Nutrition and Infection

2.6. Current status of the programme

The programme commenced this academic year 2003/04 with the large intake of 21 students. The students, including a medical doctor, have diverse academic backgrounds. The various disciplines of the current intake include:

- Bachelor of Education with Home Economics
- Bachelor of Science in Food Science and Technology
- Bachelor of Home Economics and Nutrition
- Bachelor of Science (Chemistry)
- Bachelor of Biomedical Technology
- Bachelor of Medicine and Bachelor of Surgery (MBCHB)

3. Contribution of the Nestle Foundation to the success of this programme

The Nestle Foundation has been instrumental in the initial stages of this programme. The Foundation has sponsored 5 out of the 21 students for both tuition and research. In addition, the Foundation has contributed funds for Institutional Development and for the development of nutrition research capacity. The Foundation also supported a renowned nutritionist, Professor Roger Whitehead, to come to Makerere University to facilitate the kick off of the programme. We are highly indebted to the Nestle Foundation for their tremendous support.

4. Future vision and direction of the Department of Food Science and Technology

By the end of 2004, the Department will have moved into its new facilities that include lecture theaters, offices, research and teaching laboratories, conference facilities and a state-of-the-art food processing pilot plant financially supported by Norwegian assistance for which we are highly grateful. It is the vision of the Department of Food Science and Technology that once we have moved into our new facilities, the Department will transform itself into a School of Food Technology and Human Nutrition. A Centre for Nutrition Training and Research is also being planned in collaboration with Makerere University Institute of Public Health under the proposed School. These plans, when implemented, will enable us to better contribute in the improvement of the food and nutrition security of the people of Uganda and the African Region.

Research and training in human nutrition at the Faculty of Sciences, University Cheikh Anta Diop, Dakar, Senegal: DEA and Doctorat

SALIMATA WADE¹

1. Rationale

Everybody recognises the importance of nutrition; however, graduated nutritionists at Master and Doctoral levels, as well as support for nutrition research, are incredibly lacking in Sub-Saharan Africa, particularly in the French speaking countries.

During the past years, international assistance and governments have developed local short-term training courses in nutrition in some Sub-Saharan countries, but failed to place sufficient emphasis on professionals with higher qualification. Although program oriented training is useful to answer focus problems (development of specific skills for community development workers or medical professionals), its benefit in terms of sustainable capacity building is questionable.

In most of the Sub-Saharan countries, nutrition training is integrated into the medical education courses and has no identifiable curriculum. Only a few hours are devoted to clinical nutrition and this conventional training does not have significant impact on capacity building and human resources. In addition, it usually does not take into account the multidisciplinary facets of nutritional problems.

Scientific understanding of world nutrition has progressed, but at the same time, the nutritional situation continues to be catastrophic in many developing countries. The trend, particularly in Sub-Saharan Africa is worrying. Our “old” diseases (kwashiorkor, marasmus, stunting) go under-addressed and the rapid urbanisation in Sub-Saharan Africa urbanises malnutrition, poverty and food insecurity as well. Change in diet patterns, HIV infection and greater exposure to environmental pollution, result in “new” emergency nutri-

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tional disorders and are serious threats. Lack of expertise, particularly in training and research, are the main constraints faced by the region.

Relevant training is crucially needed for African nutritionists: specifically, training of academic leaders capable of integrating our critical characteristics, adapting new knowledge to local problems, training others, carrying out high quality research, as well as transferring scientific skills.

In 1990, a few core post-graduate Senegalese nutritionists decided to join their efforts and pool funds to create a Nutrition Unit (Equipe de Nutrition) for research and training, at the University of Dakar.

2. The research unit: Equipe de Nutrition

The unit is composed of a permanent staff of four PhD graduate employees from the university, plus Masters and PhD students. The nutrition laboratory is located in the Department of Animal Biology at the Faculty of Sciences. The main research topics are:

2.1. Protein energy malnutrition and micronutrient deficiencies

- Long term effect of early malnutrition
- Maternal nutrition and child health
- Nutritional rehabilitation (severe malnutrition, malnutrition and infectious diseases)
- Nutritional intervention at the community level
- Food-based strategies to prevent micronutrient deficiencies

2.2. Energy requirement and body composition (use of stable isotopes)

- Total energy expenditure in Sub-Saharan population
- Breast milk output and infant growth
- Body composition and nutrition related chronic diseases

2.3. Metabolic effects of some African foods

3. The training: DEA and Doctorate of Human Nutrition

The DEA (Msc) and Doctorate (PhD) of Human Nutrition and Food Science were set up in 1997. The degree DEA (Diplôme d'Etudes Approfondies) is equivalent to a Master of Science degree.

In order to ensure quality of the training, a curriculum was written in line with the French (bio-medical oriented) and English (multidisciplinary-oriented) nutrition training policy. When submitted for review it had a positive reception from key international experts in nutrition.

The academic program included the participation of nutritionists, physiologists, physicians, epidemiologists, toxicologists, social scientists, food scientists, education scientists, economists and developers.

The main objective of the training is to generate a regional and valuable expertise in human nutrition and food science.

The specific objectives are to provide professionals at both Masters and PhD levels with the ability to:

- Identify national or community nutrition problems
- Plan and evaluate nutrition programs at the country or regional levels
- Educate and communicate scientific knowledge in human nutrition
- Train others (students, community development workers, professionals coming from health, agriculture, economic and other backgrounds)
- Maintain and develop a high standard of endogenous research and training capacities at the University of Dakar

3.1. Course structure and duration of the training

The DEA program extends over two academic years.

The *first year* is devoted to coursework (300 h), consisting of five core courses (modules 1 to 5). Each core is followed by seminars, visits, workshops and an individual presentation of a scientific paper (140 h).

Each module is evaluated individually and the written examination of the five modules counts for 60%. Oral and practical assessments account for 40%. A candidate who fails one module is re-evaluated only once – two weeks after the first examination.

Students entering the second year must successfully complete the first year.

Module 1 (55 hours)	Food science, African food composition tables, technology, toxicology, legislation and socio-cultural aspects
Module 2 (70 hours)	Biochemistry and physiology of nutrition, human dietary requirements during different phases of the life cycle, evaluation of nutritional status and food consumption
Module 3 (61 hours)	Under-nutrition and over-nutrition, non-communicable chronic diseases related to nutrition, nutrition and infections, malnutrition prevention and treatment
Module 4 (60 hours)	Epidemiological method in nutrition and applied statistics
Module 5 (50 hours)	Community nutrition, intervention, education, food security, nutrition planning and evaluation

During the second year, students carry out individual original research for eight months under the supervision of a senior graduate nutritionist. For evaluation, the students defend a dissertation based on their results, according to the common regulation of the Faculty of Sciences.

3.2. Doctorate

A selected number of DEA graduate students can pursue a Doctorate (PhD thesis). The duration is three years of full research under the supervision of a professor.

3.3. Entrance requirements

A new promotion is eligible every other year (next course will start in 2005-6)
Eligible candidates are selected after an interview: according to their age, curricula and merit. They are selected from those who have completed a 4-year graduate university degree in a recognised field of biology, agriculture, biochemistry, engineering sciences, or completed their medical, pharmacological or veterinary thesis
In addition they have to be knowledgeable about descriptive statistics and computer use
Professionals who meet some of these criteria are also eligible
The number of selected participants at national and regional levels is very limited

4. Institutional and financial support

The training has received the support of national and international institutions including: Faculté de Médecine, Instituts et Ecoles de l'Université Cheikh Anta Diop, Instituts Sénégalais de Technologie Alimentaire et de Recherche Agricole, Ecole Inter-Etats des Sciences et Médecines Vétérinaires de Dakar, Hôpital Albert Royer, Hôpital le Dantec, Hôpital Marc Sankalé, Hôpital Beaudouin, Dispensaire Saint Martin, Ministère Sénégalais de la Santé, ONG Basics (Dakar), IRD (Dakar, Montpellier, France), CEMUBAC (Belgique), INSERM (Université de Rouen), Université Libre de Bruxelles, Université Catholique de Louvain, Université de Liège (Belgique), Medical Research Council - Human Nutrition Cambridge (UK).

Financial support has been received from French cooperation (Projet Campus), Belgium cooperation (CUD), IAEA, and the Nestlé Foundation.

Nutrition education in Benin

ROMAIN AM DOSSA¹

The Faculty of Agricultural Sciences of the University of Abomey-Calavi (FSA/UAC) is the institute of the University in Benin that is in charge of training the human resources required to integrate the nutritional aspects in agriculture and development. The Department of Nutrition and Food Sciences (DNSA), that is one of the five departments of the faculty, provides this training at present.

Two trainings can be distinguished: nutrition education as part of the traditional training program of our agricultural students and the on-work training program through the Formation Internationale en Nutrition et Sciences Alimentaires (FINSA).

1. The Department of Nutrition and Food Sciences (DNSA)

The mission of the FSA is to train agricultural students for a period of five years to the level where they are capable of receiving the diploma of Engineer in Agricultural Sciences. This training is scheduled for four years in common curriculum, plus one year specialising in one of the five following departments of the Faculty: Animal Sciences (DPA), Vegetal Sciences (DPV), Economy, Sociology and Communication (DESAC), Management of the Environment (DAGE), Nutrition and Food Sciences (DNSA).

The DNSA, previously a section of the DPA, became a department in 1992. It has been equipped with three laboratories: the laboratory of physiology of nutrition, the laboratory of food chemistry and biochemistry, and the laboratory of food microbiology. The department also has a food technology workshop. These laboratories carry out the training and research activities of the department.

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Each year about 8 to 10 students are admitted into the department for their final year of training and research activities, under the supervision of a senior lecturer and researcher in a specific domain of food and nutrition.

2. The FINSA

2.1. Background

In the framework of the cooperation between the Faculty of Agricultural Sciences of the University of Abomey-Calavi in Benin, the Wageningen University and the University of Utrecht in the Netherlands, a Nutrition and Food Sciences Section was created within the Department of Animal Sciences. Later, this section became the department DNSA.

To achieve the main mission of this young department (which is to train engineers in agriculture specialising in the field of nutrition and food sciences), the collaboration project focused on the following aspects:

- Laboratory equipment
- Training of trainers
- The involvement of lecturers from the Netherlands in the training program in Benin

A workshop was jointly organised in 1987 by the International Centre for Agriculture in the Netherlands with the FAO and FSA, concerning the introduction of nutrition aspects on the curriculum of faculties and schools of agriculture in Africa. Two main recommendations were drawn from this workshop:

- Teaching human nutrition in these institutions is important and required
- Each country should introduce a general nutrition component in its curriculum, while the FSA should become the centre of excellence in the region of west and central French speaking Africa, as far as human nutrition is concerned

To fulfil these requirements, the FSA had two approaches. The first and longest one involved students from the French-speaking countries of central and western Africa providing them with a specialisation in the field of human nutrition.

The second approach involved using the resources available in our faculty to offer appropriate training and refresher courses to all professionals of the mentioned region, who are directly or indirectly involved in the elaboration, implementation, follow-up and evaluation of food and nutrition plans and policies in their countries. An institution named 'Formation Internationale en Nutrition et Sciences

Alimentaires' (FINSA) was therefore created in 1992 to implement this second approach.

The FINSA is a four-week course held every year during August and its 13th edition is this year, 2004.

From the point of view of many of the participants in the FINSA courses, organising a short course in human nutrition and food sciences was a good opportunity and filled in an existing gap in the region.

2.2. Objective of FINSA

FINSA is a programme providing professional and refresher training, taking into account the specific needs expressed by the target group, who are mainly professionals in the field of human nutrition and food sciences from sub-Saharan French speaking countries in Africa.

2.3. Activities of FINSA

So far, FINSA has focused on training and three options are available:

- The regular four-week FINSA training programme
- Short duration courses of two weeks
- On demand, specific training for an individual or group

2.3.1. The regular 4 week training programme of FINSA

This is the first type of training offered by FINSA and targets professionals in charge of elaboration, implementation and evaluation of national plans and policies having a direct or indirect impact on nutrition and food security.

Since its first edition in 1992, the regular training programme of FINSA has developed six themes, as shown in the following table:

	Themes	Editions
01	Food Security and Maternal and Child Health	1992, 1993
02	Nationwide Food Security Programmes: Micronutrient deficiencies	1994, 1995, 1996, 1997
03	Food and Nutrition Security for Health and Development	1998
04	Food and Nutrition Security for a Sustainable Development	1999, 2000
05	Food and Nutrition Security for a Sustainable Human Development	2001, 2002
06	Food and Nutrition Security, Health and Community Development	2003

Between 1992 and 2003, FINSA trained participants from 19 French speaking countries in west and central Africa, countries in east Africa (Rwanda, Burundi) as well as from Comoros and Haiti (see table 1).

Table 1. Distribution of participants by country, age and sex (period 1992–2003).

COUNTRIES	MALES	FEMALES	TOTAL
Benin	29	24	53
Burkina Faso	10	05	15
Burundi	02	02	03
Cameroon	05	02	08
Comoros	01	00	01
Congo	04	03	07
Ivory-Coast	06	12	18
Gabon	00	06	06
Guinea	06	01	07
Guinea-Bissau	02	02	04
Haiti	00	01	01
Mali	09	11	20
Mauritania	03	00	03
Niger	10	05	15
Central African	01	05	06
Republik	04	00	04
DR Congo	07	01	08
Rwanda	10	04	14
Senegal	02	01	03
Chad	06	02	08
Togo			
TOTAL	117	87	204

Benin has provided the largest number of participants (53), followed by Mali (20), Ivory Coast (18), Niger, Burkina-Faso (15) and Senegal (14).

2.3.2. Short duration courses

Since 2000, FINSA has offered three short duration training courses of two weeks, with the purpose of diversifying its training options while satisfying the needs in various domains of nutrition and food security.

As a first experience, training on “Community Nutrition Programmes” was successfully held at Bohicon, which is about 100 km from Cotonou the main city in Benin.

In the same way, training on “Information, Education and Communication for Nutrition” was also successfully carried out at Ouidah, in the South of Benin.

A third training course started in 2001 and is entitled “Infant Feeding and Production of Complementary Foods”.

The number of participants for the short duration FINSA training courses are shown in Table 2. It appears that the highest number of participants was achieved by Mauritania with 14.

- (1) Community Nutrition Programs
- (2) Information, Education and Communication for Nutrition
- (3) Infant Feeding and Production of Complementary Foods

Table 2. Distribution of participants by country and course (period 2000–2003).

Countries	Courses			Total
	(1)	(2)	(3)	
Benin	04	00	04	08
Burkina	00	00	04	04
Burundi	01	01	00	02
Cameroon	01	01	02	04
Comoros	00	00	00	00
Congo	00	00	00	00
Ivory-Coast	00	00	00	00
Gabon	00	00	00	00
Guinea	04	03	00	07
Guinea-Bissau	01	00	00	01
Haiti	00	00	00	00
Mali	02	00	00	02
Mauritania	09	05	00	14
Niger	01	02	00	03
Central African	00	00	00	00
Republic	02	00	00	02
DR Congo	01	01	02	04
Rwanda	03	02	00	05
Senegal	03	00	00	03
Chad	01	00	00	01
Togo				
TOTAL	33	15	12	60

2.3.3. Training on demand

FINSA also offers possibilities for training individuals or groups of people who express specific training requirements. Thus in the past, several training sessions have been organized:

- During 1975, three professionals from Niger were trained in community nutrition. These people work in a food security project and their training was sponsored by the FAO, with the last 9 months in Benin.
- Training in human nutrition for a health professional from the Ministry of Health of Niger. This was a 9-month training program between January-September 1996 sponsored by UNICEF.
- Training in human nutrition for four health professionals from the Ministry of Health and Social Affairs of Mauritania. This was three months of training held during 1997 and sponsored by their government.
- Training of health professionals in the elaboration of a nutrition curriculum for the National Institute of Public Health of Niger was held in 2003 and was sponsored by UNICEF.

FINSA can also offer training programs at the request of a group of countries or international institutions for professionals from French speaking African countries. Recently from 24th to 28th May 2004,

FINSA successfully organised an international workshop for training professionals from eight French speaking African countries (Benin, Burkina Faso, Burundi, Cameroon, Guinea, Niger, RDC and Togo), on the “Elaboration and Implementation of National Food, Nutrition Policies and Plans”. This workshop was jointly sponsored by the regional offices of FAO and WHO for Africa.

2.4. The experience of FINSA

Following the thirteen successful editions of the FINSA course, the institution has gained much experience and it is important to note the following facts:

- The FINSA institution was created 12 years ago and is still functioning in spite of the creation of equivalent courses in the region.
- FINSA was the first training program in the western and central African French speaking region and is the only one that is still functioning.
- The diversification of FINSA's activities became a reality with a positive evolution from one 4-week course to additional shorter 2-week courses, as well as “on demand” training programs.
- FINSA has been adopted by the UNICEF, WHO and FAO as well as by national and international NGOs in the region. The number of scholarships provided by these institutions illustrates this fact.
- FINSA has contributed to the improvement of the capacities of several national institutions involved in nutrition and food security. Given the number of participants from these countries who have attended FINSA training programs and because of the position of these participants in the decision-making systems of these countries, the contribution of FINSA to institutional capacity building in several countries is remarkable. It has also been reported that because of their attendance to a FINSA training program, several participants have been promoted.

2.5. What future do we expect for FINSA?

Our main goal is that FINSA should become a regional training institution that will fulfil all the needs of the Sub Saharan African French speaking countries as far as food and nutrition is concerned.