HUMAN NUTRITION
IN THE DEVELOPING WORLD

by

Michael C. Latham
Professor of International Nutrition
Cornell University
Ithaca, New York, USA

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 1997
Foreword

Human nutrition in the developing world contributes to the continuing efforts of the Food and Agriculture Organization (FAO) to improve the nutritional status of all populations. It is produced to reinforce FAO’s implementation of the recommendations of the International Conference on Nutrition (ICN), held in December 1992 in Rome. It provides detailed and amplified information on the major themes addressed during the ICN, in a simple and practical manner. The book draws from the earlier publication Human nutrition in tropical Africa (FAO, 1965; second edition 1979), presenting an expanded, up-to-date, global perspective.

FAO strongly emphasizes that food-based approaches are the only sustainable way to improve the nutritional status of all. In developing countries better development of agricultural resources can improve food supplies, employment and incomes and enable adequate diets. Even among low-income families, diets can be improved by properly combining foods that are commonly available. Every food can have an important function in the human diet.

This book provides sound science-based information on food, nutrients, the causes of malnutrition, nutritional disorders and their prevention. The information can be used by workers in the field and disseminated to assist the public in making informed food choices and appropriate decisions about diet. The publication will be especially useful for those working with rural populations.

While various aspects of human nutrition are covered in this text, special emphasis is given to applied and multidisciplinary approaches for the alleviation of malnutrition. These approaches should facilitate both intersectoral and multisectoral actions for promoting and protecting nutritional well-being among people in developing countries.

It is hoped that Human nutrition in the developing world will serve as a comprehensive introduction to nutritional problems in developing countries. The book is also designed as a useful reference for workers in agriculture, health, education and other fields who are seeking to promote simple, practical and affordable actions to solve nutritional problems in developing countries.

This book was made possible through Professor Michael Latham’s prodigious work in preparing the basic text. We at FAO are extremely grateful to Professor Latham for sharing his vast knowledge of nutrition with all readers.

John R. Lupien
Director
FAO Food and Nutrition Division
Preface

This book is designed to cover the most important nutritional problems of developing countries and to suggest appropriate programmes and policies to address these. Good nutrition for all of humankind is a basic human right. This requires food security, good health and adequate care.

A bibliography is provided to bring some useful publications to the reader’s attention; however, since this book is likely to be used by many persons who do not have easy access to good scientific, agricultural or medical libraries, the bibliography does not include journal articles, except for those that are cited in the text. For the same reason, the bibliography is not comprehensive; I can acknowledge in only a general way the many hundreds of books, journal articles, reports and pamphlets that I have consulted or those publications that have led to the total sum of knowledge that makes possible the preparation of a book such as this. Two books in the bibliography deserve special attention because they were most often consulted: Davidson and Passmore’s *Human nutrition and dietetics*, a comprehensive textbook of nutrition; and King and Burgess’ *Nutrition for developing countries*, a practical guide for nutrition workers dealing with problems in poor countries. Both are excellent publications.

I wish to acknowledge with gratitude some of the institutions that over many years have influenced my thinking on health, nutrition and development. These include Trinity College in Dublin, Ireland, where I studied medicine; the London School of Hygiene and Tropical Medicine, where I completed a degree in tropical public health; and Harvard University, where I attained a Master of Public Health degree and worked in the Department of Nutrition. However, it was more than nine years’ experience working in the United Republic of Tanzania, both as a District Medical Officer and as Director of the Nutrition Unit in the Ministry of Health, that most enriched my knowledge of medicine, nutrition and life.

More than 25 years’ service as Director and Professor of International Nutrition at Cornell University has provided me an unusual opportunity to work with a faculty with expertise in almost every aspect of nutrition, to learn from and to guide an extraordinary group of graduate students from all parts of the world and to be involved on the ground in a wide variety of nutrition activities in Africa, Asia and the Americas. These associations and experiences have been greatly rewarding to me and in different ways have influenced the content of this publication.
## Contents

Foreword iii  
Preface v  
Acknowledgements xi  

<table>
<thead>
<tr>
<th>PARTE I</th>
<th>CAUSES OF MALNUTRITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 1</td>
<td>INTERNATIONAL NUTRITION AND WORLD FOOD PROBLEMS IN PERSPECTIVE 3</td>
</tr>
<tr>
<td>Chapter 2</td>
<td>FOOD PRODUCTION AND FOOD SECURITY 15</td>
</tr>
<tr>
<td>Chapter 3</td>
<td>NUTRITION AND INFECTION, HEALTH AND DISEASE 23</td>
</tr>
<tr>
<td>Chapter 4</td>
<td>SOCIAL AND CULTURAL FACTORS IN NUTRITION 31</td>
</tr>
<tr>
<td>Chapter 5</td>
<td>POPULATION, FOOD, NUTRITION AND FAMILY PLANNING 37</td>
</tr>
<tr>
<td>Chapter 6</td>
<td>NUTRITION DURING PARTICULAR TIMES IN THE LIFE CYCLE: PREGNANCY, LACTATION, INFANCY, CHILDHOOD AND OLD AGE 45</td>
</tr>
<tr>
<td>Chapter 7</td>
<td>BREASTFEEDING 61</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PARTE II</th>
<th>BASIC NUTRITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 8</td>
<td>BODY COMPOSITION, THE FUNCTIONS OF FOOD, METABOLISM AND ENERGY 83</td>
</tr>
<tr>
<td>Chapter 9</td>
<td>MACRONUTRIENTS: CARBOHYDRATES, FATS AND PROTEINS 91</td>
</tr>
<tr>
<td>Chapter 10</td>
<td>MINERALS 101</td>
</tr>
<tr>
<td>Chapter 11</td>
<td>VITAMINS 111</td>
</tr>
</tbody>
</table>
Chapter 26
CEREALS, STARCHY ROOTS AND OTHER MAINLY CARBOHYDRATE FOODS 255

Chapter 27
LEGUMES, NUTS AND OILSEEDS 271

Chapter 28
VEGETABLES AND FRUITS 277

Chapter 29
MEAT, FISH, EGGS, MILK AND THEIR PRODUCTS 283

Chapter 30
OILS AND FATS 291

Chapter 31
BEVERAGES AND CONDIMENTS 293

Chapter 32
FOOD PROCESSING AND FORTIFICATION 295

PARTE V
NUTRITION POLICIES AND PROGRAMMES

Chapter 33
ASSESSMENT, ANALYSIS AND SURVEILLANCE OF NUTRITION 307

Chapter 34
IMPROVING FOOD QUALITY AND SAFETY 329

Chapter 35
IMPROVING HOUSEHOLD FOOD SECURITY 341

Chapter 36
CARE AND NUTRITION 351

Chapter 37
PROTECTION AND PROMOTION OF GOOD HEALTH 359

Chapter 38
PROMOTING APPROPRIATE DIETS AND HEALTHY LIFESTYLES 385

Chapter 39
PREVENTING SPECIFIC MICRONUTRIENT DEFICIENCIES 399

Chapter 40
FAMILY FEEDING, GROUP FEEDING AND STREET FOODS 419

Chapter 41
INTEGRATING NUTRITION OBJECTIVES INTO DEVELOPMENT POLICIES AND PROGRAMMES AT THE NATIONAL AND LOCAL LEVELS 443
ANNEXES

Annex 1
RECOMMENDED INTAKES OF NUTRIENTS 457

Annex 2
ANTHROPOMETRIC TABLES FOR ASSESSMENT OF NUTRITIONAL STATUS AND DENTITION AGES 461

Annex 3
NUTRIENT CONTENT OF SELECTED FOODS 483

Annex 4
REFERENCE NUTRIENT DENSITIES RELEVANT FOR DEVELOPING AND EVALUATING FOOD-BASED DIETARY GUIDELINES 489

Annex 5
CONVERSIONS 491

BIBLIOGRAPHY 493

INDEX 501