Contents

Observations on the Natural History of Stunting  ...................... 1
  J. C. Waterlow

The Epidemiology of Stunting ............................................. 17
  W. Keller

The Use of Short-Term Increments in Length to Monitor
  Growth in Infancy .................................................... 41
  M. J. R. Healy, M. Yang, J. M. Tanner,
  and F. Y. Zumrawi

Poverty and Stature in Children ........................................ 57
  R. Martorell, F. Mendoza,
  and R. Castillo

The Importance of Genetic Influences on Growth in Early
  Childhood with Particular Reference to Children of
  Asiatic Origin ......................................................... 75
  D. P. Davies

Determinants of Growth in Utero ...................................... 91
  R. D. G. Milner

Endocrine Control of Growth ........................................... 109
  R. Rappaport

Nutritional Growth Retardation: Experimental Studies with
  Special Reference to Calcium ........................................ 127
  D. R. Fraser

The Role of Individual Nutrient Deficiencies in Growth
  Retardation of Children as Exemplified by
  Zinc and Protein ..................................................... 143
  M. H. N. Golden


The Importance of Infections and Environmental Factors as Possible Determinants of Growth Retardation in Children

D. Nabarro, P. Howard, C. Cassels, M. Pant, A. Wijga, and N. Padfield

The Risk of Morbidity in a Stunted Child

A. Tomkins

Mental Development and Stunting

M. Colombo, I. de Andraca, and I. López


G. B. Spurr

Linear Growth Retardation and Mortality

W. Van Lerberghe

Stunting: Significance and Implications for Public Health Policy

C. Gopalan

Subject Index
Preface

In many Third World countries, 30% or more of children under 5 years may be diagnosed as malnourished solely on the basis of a low height or length for age by comparison with international standards. For brevity this deficit in linear growth is often referred to as stunting, a term that was introduced because it is purely descriptive. What right have we to diagnose this growth deficit as malnutrition? There is grave danger of a circular argument. It is probably true that nutritional deficiency in general leads to impairment of linear growth; it is certainly not true that all such impairment is caused by malnutrition, although there may perhaps be a common final metabolic or endocrine pathway. If one asks, "How do we know that malnutrition causes this growth deficit in the Third World?" the only answer in the present state of knowledge is that the existence of the deficit defines the presence of malnutrition.

This is clearly a most unsatisfactory situation, particularly because the problem is not a trivial one. Stunting is not only very prevalent, but it has important social implications, since it is widely regarded as an index of poverty. At the biological level, some look on stunting as a useful adaptation that enhances the chances of survival; others emphasize the physical and psychological handicaps that may be associated, directly or indirectly, with stunting.

It seems that the only way to make progress in this situation is to withdraw from concepts that cannot be defined, such as malnutrition and poverty, and to look objectively at the facts that we do have: the epidemiology and natural history of the process; the biological mechanisms that determine growth failure, because in the end there must be a metabolic cause; the environmental factors that set the process going; and the handicaps, if any, associated with it or even caused by it.

The question has important implications for policy. Are these large numbers of children malnourished in any meaningful way? I myself do not think it is enough simply to say that stunting is an index of poverty and that this requires a holistic approach. This may be true, but it is not particularly helpful. A useful approach may be that if we regard stunting as an indicator, it is difficult to develop a rational policy, even a policy to do nothing, unless we know more about what the indicator really means. Such knowledge should help in using limited resources more effectively.

This position is an article of faith, and I do not expect everyone to agree with it. Nevertheless, I do believe that the Workshop may have contributed to a better definition of the problem and hence may stimulate further research and discussion.

JOHN C. WATERLOW
Acknowledgments

As the initiator of the Fourteenth Nestlé Nutrition Workshop, I wish to record my gratitude to Nestlé for its generous and imaginative support, and in particular to Dr. P. Guesry, who made that support possible. We are greatly indebted to M. P. Guinand and his colleagues who were responsible for the arrangements in Thailand; to Dr. P. Goyens for his assistance in editing the discussions, and to Mrs. Jennifer Bohn-Pink who surmounted the difficulties of transcribing them.
Foreword

The idea of this workshop, *Linear Growth Retardation in Less Developed Countries*, came from the need to get a better understanding of a condition that, though extremely common, has been studied very little from a scientific point of view.

What could be more appropriate than a Nestlé Nutrition Workshop bringing together research scientists and practicing pediatricians in a forum for discussion of the subject in depth? Many aspects of "nutritional stunting" were extensively discussed, with contributions from epidemiologists, auxologists, nutritionists, endocrinologists, and pediatricians.

More questions were raised than can be answered, but progress was made in defining the extent of the problem, its implications for pediatricians, and the needs for further research.

PIERRE R. GUESRY, M.D.
Vice President
NESTEC Ltd.
Avenue Nestlé 55
1800 Vevey, Switzerland