

# Foreword

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Adequate zinc nutrition is essential for health. The serious adverse consequences of zinc deficiency were first demonstrated in animal models, followed by evidence in humans that zinc deficiency seriously limits growth in infants and children and decreases resistance to infections. More recently, the importance of zinc nutrition for optimal pregnancy outcome has been emphasized. Assessing the prevalence and severity of zinc deficiency in populations is critical to determine the need for interventions and to monitor the efficacy and effectiveness of large-scale interventions to combat this public health problem. Unfortunately, the lack of specific biochemical indicators of zinc status has limited progress, and despite the serious adverse consequences of zinc deficiency for human health, there have been few attempts to implement large-scale interventions to combat this public health problem.

Zinc has been identified as an essential component of metalloenzymes, polyribosomes, cell membranes, and cellular function and plays a central role in cellular growth, tissue differentiation, protein synthesis, and the immune function. The extent of zinc deficiency worldwide is not well documented. All population groups are potentially at risk for zinc deficiency, but infants and young children are probably the most vulnerable. In a recently published review article, zinc deficiency was estimated to be responsible for approximately 4% of the disability-adjusted life-years (DALYs) in children in developing countries [1]. The health consequences of severe zinc deficiency are easy to recognize and include dermatitis, growth retardation, delayed sexual maturation, and recurrent infection. Mild to moderate deficiencies are much more difficult to diagnose, because the signs and symptoms, such as increased susceptibility to infections and reduced growth rate, are also seen in many other nutrient disorders and common childhood infectious diseases.

The main source of dietary zinc is animal products. The daily requirements for zinc from the diet may be

difficult to meet in populations who consume little meat or whose staple foods have a high phytate content that reduces zinc bioavailability, and those who live in environments with a soil poor in zinc as a result of erosion or leaching by heavy rainfall. Because these factors are more common in the nonindustrialized world, zinc deficiency is likely to be more prevalent in this part of the world. However, the extent of zinc deficiency worldwide is not well documented. This is partly due to the lack of reliable and widely accepted indicators of zinc status, especially those able to detect mild or marginal deficiencies—the forms that are most prevalent.

In order to be better informed on the public health significance of zinc deficiency, to develop appropriate zinc intervention programs, and to assess their effectiveness for improving the health and well-being of high-risk populations, it is essential to have reliable indicators to measure the prevalence and severity of zinc deficiency in populations. Therefore, the World Health Organization, jointly with UNICEF and the International Atomic Energy Agency, convened a Technical Consultation to review the currently available indicators to assess zinc status at the population level and monitor the response to an intervention, and to provide recommendations for the development of guidelines to Member States on the way to use these indicators.

The overall aims of the meeting were:

- » To review existing data on indicators to assess and monitor zinc status in populations; and
- » To develop recommendations on the use of appropriate indicators in large-scale surveys and evaluations of nutrition interventions to combat zinc deficiency.

In preparation for this meeting, three background papers were commissioned on the following issues: functional indicators for assessing zinc deficiency, serum zinc concentration as an indicator of population zinc deficiency, and dietary indicators for assessing the

adequacy of population zinc intakes.

These papers were presented during the Consultation and discussed in detail. Based on the outcomes of the discussion and the information put together in the background papers, the participants made recommendations that are presented in this issue of the *Food and*

*Nutrition Bulletin*, together with the background papers.

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## References

1. Jones G, Steketee RW, Black RE, Bhutta ZA, Morris SS, and the Bellagio Child Survival Study Group. How many deaths can we prevent this year? *Lancet* 2003; 362:65–71.