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Impact of vitamin A and iron on anaemia and cognitive
functioning of anaemic school children in Tanzania

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SUMMARY

Micronutrient deficiencies are serious problems. They hinder mental and physical development and are important causes of death in developing countries. They also hinder the socio-economic development of the affected population.

Iron deficiency which is often manifested as iron deficiency anaemia (IDA) is the most prevalent nutritional deficiency world-wide. It affects nearly 5 billion people in the world. Nearly 90 percent of anaemia in the world is due to iron deficiency. The problem is much more severe in developing countries, although the developed countries are not spared.

The studies presented in this thesis examined the complex nature of interrelationships between iron deficiency anaemia and its determinants. Both experimental and survey methods were employed. The experimental method was used to investigate the impact of dietary supplements on the biomedical and cognitive functioning of the study subjects. Surveys were also conducted because it was thought that the local context in which the problems evolved must be understood for effective control of the problem of iron deficiency anaemia.

This thesis examined the impact of iron and vitamin A supplementation on the haemoglobin concentrations and cognitive function of 9 to 12 year old anaemic school children from the rural and remote area in Tanzania. The findings suggest that both vitamin A and iron raise their haemoglobin levels. Furthermore, the results suggest that vitamin A in combination with iron may have a role in improving the cognitive function of anaemic school children. This study

showed that relatively small changes in nutritional status can bring about major health and cognitive improvements.

School children, parents and teachers were interviewed to examine their knowledge, attitudes and practices towards anaemia control. The results of these surveys showed that school children's knowledge of causes and prevention of anaemia was poor compared to that of their parents and teachers. Moreover, the results showed that children's dietary intake was poor and could be one amongst many causes of anaemia in these children. However, the parents were willing to participate in activities that would improve their children's health and education, for example via provision of school meals and improvement of school physical environments.

The thesis also examined the iron concentrations and bioavailability in two varieties of maize, one the main staple food in Tanzania and the other, a newly bred iron-rich variety from Zimbabwe. Although the newly bred variety had higher iron concentrations, its bioavailability was lower than the conventionally consumed variety, indicating need for further work in breeding high micronutrient dense and highly bioavailable varieties.

The results of the thesis indicate that the causes of malnutrition and micronutrient deficiencies, especially iron deficiency anaemia, are complex, context dependent and dynamic in nature.

While these results identify dietary supplements as effective short-term interventions, the complexity of micronutrient deficiency causation demands a new holistic paradigm for its control. This is described in a set of set of recommendations.

Holistic systems approaches have particular value in addressing micronutrient deficiencies because they consider a variety of causal variables. Relevant factors such as community participation, women's empowerment, improvement of farming systems and storage of foods, plant breeding and possibly the use of dietary supplements in the short term, are all important in addressing micronutrient deficiencies. All these require policies that encourage integrated and well co-ordinated multi-sectoral strategies that promote nutritional outcomes through such means as education, health, information technology, financial support (e.g. micro-credit), political commitments, agricultural research and sustainable development.