ACRONYMS AND ABBREVIATIONS

AIDS Acquired Immune Deficiency Syndrome
APR Annual Performance Report
ARI Acute Respiratory Infection
ASDP Agricultural Sector Development Program
BMI Body Mass Index
C-IMCI Community Integrated Management of Childhood Illness
DHS Demographic and Health Survey
DP Development Partner
DPG Development Partner Group
ESW Economic and Sector Work
FAO Food and Agriculture Organization
GBS General Budget Support
HIV Human Immunodeficiency Virus
HIK Helen Keller International
JAST Joint Assistance Strategy for Tanzania
MCDGC Ministry of Community Development, Gender and Children
MDA Ministry, Department and Agency
MDG Millennium Development Goal
M&E Monitoring and Evaluation
MKUKUTA Mikati wa Kukutu Uchumi na Kupunguza Umaskini Tanzania
MoAFC Ministry of Agriculture, Food Security and Cooperatives
MoEVT Ministry of Education and Vocational Training
MoHSW Ministry of Health and Social Welfare
MPEE Ministry of Planning, Economy and Empowerment
NBS National Bureau of Statistics
NCHS National Center for Health Statistics
NGO Non-Governmental Organization
NSR Nutrition Sector Review
OPRAS Open Performance Review Appraisal System
ORS Oral Rehydration Salt
PER Public Expenditure Review
PO-PSM Presidents Office – Public Service Management
PMO-RALG Prime Ministers Office–Regional Administration and Local Government
REPOA Research on Poverty Alleviation
STD Sexually Transmitted Disease
SWG Sector Working Group
<table>
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<th>Acronym</th>
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<tr>
<td>TFNC</td>
<td>Tanzania Food and Nutrition Centre</td>
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<td>THIS</td>
<td>Tanzania HIV/AIDS Indicator Survey</td>
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<td>TACAIDS</td>
<td>Tanzania Commission for AIDS</td>
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<td>TASAF</td>
<td>Tanzania Social Action Fund</td>
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<td>UN-DAF</td>
<td>UN-Development Assistance Framework</td>
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<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<td>WHO</td>
<td>World Health Organization</td>
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<td>YSCD</td>
<td>Youth and Child Survival and Development</td>
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I have talked at length about this question of food because the foundation of development is people. A hungry person cannot bring progress. He is weak of body and also weak of mind. This must always be remembered; especially in relation to children. When a child is not well fed, he will not grow properly - he will be deformed, and his intelligence will be affected also; he will not reach his full potential. –Julius K. Nyerere
FOUR MYTHS ABOUT NUTRITION

Poor nutrition is intimately linked with poor health, inadequate caring practices and poor environmental conditions. But planners, health specialists, politicians, and economists often fail to recognize these connections. Serious misunderstandings include the following myths:

Myth 1: Malnutrition is primarily a matter of insufficient food intake. Not so. Food is of course important and many in Tanzania have an inadequate diet and insufficient calorie intake. But most serious malnutrition occurs during the first two years of life and is caused by disease (malaria, respiratory infections, worm infestations), poor sanitation leading to diarrhea, especially among young children, and a diet that is too uniform to provide all nutrients the body needs. Behavioral change plays a big part in improving nutrition.

Myth 2: Improved nutrition is a by-product of other measures of poverty reduction and economic advance. It is not possible to jump-start the process. Again, untrue. Improving nutrition requires focused action by parents and communities and local and national action in health and public services, especially water, sanitation, malaria control and HIV/AIDS. Thailand has shown that moderate and severe malnutrition can be reduced by 75% or more in a decade by such means. In rural Tanzania, stunting was reduced by 7% and underweight by 8% between 1999 and 2004 through a combination of increased household income and other factors including increased use of bed nets, more rapid treatment of malaria, improved access to safe water and improved sanitation.

Myth 3: Given scarce resources, broad-based action on nutrition is hardly feasible on a mass scale. Wrong again. In spite of severe economic constraints, some impressive achievements have been attained. Over two-thirds of Tanzanians now consume iodized salt. Over 80% of children a year now receive vitamin A capsules, tackling the nutrient deficiency that causes blindness and increases child mortality. Mass immunization, malaria prevention and promotion of oral rehydration to reduce deaths from diarrhea have also done much to improve nutrition.

Myth 4: Investing in nutrition improves the welfare of individuals but does not contribute to economic growth. Not correct. Improvements in nutrition have been shown to yield significant benefits contributing to increased labor productivity, directly through improved physical strength and indirectly through improved intelligence and school performance and reduced cost of health care. Cost-benefit ratios for nutrition interventions indicate high rates of return on nutrition investments.
NUTRITION AND THE MDGs

Goal 1 – Eradicate extreme poverty and hunger
- Malnutrition erodes human capital and reduces labor productivity.
- Malnutrition increases susceptibility to disease leading to high private and public cost for health care and reduced incomes.
- Malnutrition can disable. Vitamin A deficiency can cause blindness and iodine deficiency impairs mental development.

Goal 2 – Achieve Universal Primary Education
- Malnutrition (iodine and iron deficiencies) reduces learning capacity.
- Malnourished children are less likely to enroll in school, enroll later in school than other children and complete fewer years of education.
- Hunger reduces school performance.

Goal 3 – Promote Gender Equality and Empower Women
- Better maternal education reduces the likelihood of malnourished children.

Goal 4 – Reduce child mortality
- Malnutrition is associated with more than 50% of all child mortality.
- Vitamin and minerals (vitamin A, zinc) are key to child survival; vitamin A supplementation has the potential to reduce infant mortality by 23% among deficient populations.

Goal 5 – Improve maternal health
- Stunting increases a mother’s risk during labor.
- Deficiencies of several micronutrients (iron, vitamin A, folate, calcium, iodine) are associated with pregnancy complications and maternal mortality.

Goal 6 – Combat HIV/AIDS, malaria and other diseases
- Malnutrition is a major contributor to the overall burden of disease.
- Malnutrition hastens the onset of AIDS amongst HIV positive individuals.
- Malnutrition compromises the efficacy, efficiency and safety of ARV treatment and weakens the resistance to opportunistic infections.
- Malnutrition reduces malaria survival rates.
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The book Repositioning Nutrition as Central to Development. A Strategy for Large-Scale Action, World Bank, 2006 has been an invaluable resource for this ESW as it brings together international evidence on the rationale to invest in nutrition and provides a practical approach on how to accelerate progress in nutrition. The box on page ii and the maps on page iii have been adapted from this book, which can be downloaded from: http://siteresources.worldbank.org/NUTRITION/Resources/281846-1131636806329/NutritionStrategy.pdf.
EXECUTIVE SUMMARY

1. **Nutrition indicators for Tanzania are troubling.** Almost four out of every 10 children aged 0 to 59 months are chronically undernourished and thus too short for their age; about one out of every five children weighs too little given their height. Over 60% of all children and 50% of all women are anemic. 44% of Tanzanians are energy deficient and unable to simultaneously sustain their body and carry out even light physical activity.

2. **The prevalence of malnutrition differs little by wealth class.** Poor households are only slightly more affected than non-poor households and differences in the prevalence of under-nutrition between households in the first two wealth quintiles (poor households) and those in the third and fourth wealth quintiles (non-poor households) are negligible. Only households in the top wealth quintile are less affected, but even in these households as many as one in five children are stunted (evidencing chronic malnutrition).

   **Figure E. 1 Malnutrition in 2004 by wealth quintile for children less 5 years old**

   ![Malnutrition by Wealth Quintile](image)

   **Source:** Author’s calculations based on DHS 2004.

3. **Malnutrition is associated with high maternal and infant and child mortality.** Malnutrition is a major contributor to infant and childhood mortality. A small or very small newborn is almost four times as likely to die during the first month of life than a baby of average weight or more. A child that is severely underweight is more than eight times more likely to die from infectious disease than a well nourished child. All in all malnutrition is associated with over 50% of childhood mortality. Malnutrition also affects maternal mortality; women of small stature and anemic women, are more likely to die as a consequence of child birth.
4. **Malnutrition is associated with high morbidity.** Malnutrition increases the risk of illness and potentially leads to a vicious cycle with impaired immunity leading to infection with attendant loss of appetite and increased use of energy stores and, thus, an increased likelihood of additional malnutrition. Malnutrition is a fundamental factor contributing to malaria-associated morbidity and the onset of AIDS for those infected by HIV. Low weight for height alone is held responsible for 9.5% of global burden of disease. Iron, vitamin A, and zinc deficiencies add another 6.2%.

5. **Malnutrition is bad for education outcomes.** Well nourished children have higher IQs, go to school at an earlier age, are better able to concentrate when at school and are likely to complete more grades. Evidence from Kagera shows that eliminating malnutrition reduces the proportion of children who never attended school by up to 13%, reduces the years of delay in school enrollment by approximately one year, and increases the total years of schooling by up to 1.5 years.

6. **Malnutrition reduces labor productivity.** Inadequate caloric intake and anemia have direct consequences for the ability to be productive. Depending on the nature of the labor, eliminating anemia has been found to raise labor productivity by 5-17%. Malnutrition also has indirect consequences for labor productivity. Evidence from Kagera shows that the combined effect of lower education outcomes and smaller stature due to childhood malnutrition reduces lifetime income by as much as 12%.

7. **Addressing malnutrition allows breaking the existing poverty-malnutrition cycle by improving the ability to be productive.** Severe under-nutrition can trap people in a situation of low income and persistent under-nutrition. Malnourished children are more likely not to fulfill their full developmental potential and as adults are more likely to be poorly educated and of small stature both of which are related to low incomes. Low household income, in turn, results in a greater likelihood of their children being malnourished, thus contributing to the intergenerational transmission of poverty. By addressing malnutrition this vicious cycle can be broken.

8. **Investments in nutrition are investments in economic growth.** Nobel Prize-winning economist Robert Fogel has estimated that about half the economic growth in Britain between 1780 and 1980 can be attributed to improved nutrition. In Tanzania, investments in nutrition equally have the ability to lay the foundation for future economic growth. Some benefits of nutrition investments will be immediate, others will materialize once the beneficiaries of nutrition interventions enter the labor market as healthier, more physically fit and better educated individuals.

9. **Poor diets (quantity as well as quality), inadequate caring practices and unhealthy living environments are major factors contributing to malnutrition.** The prevailing view in Tanzania stresses the importance of improving caring practices for small children and of addressing unhealthy living conditions. This analysis supports this but also finds that inadequate calorie intake and an undiversified diet equally contribute to an undernourished population.
10. **Income growth is a necessary but not a sufficient condition to achieving the MDG and MKUKUTA goals for nutrition.** Greater income allows families to spend more on food, clean water, hygiene and preventive and curative health care. It allows them to have a more diversified diet and to obtain more effective childcare arrangements. At the community level greater income will eventually lead to better access to and higher quality health care, improved water and sanitation systems and greater access to information. However, the income elasticity for nutrition is low: between 0.25 and 0.5 implying that a 10% increase in income leads to a 2.5% to 5% reduction in malnutrition. As a consequence and despite the high GDP growth that Tanzania is currently experiencing, income growth alone will not be sufficient to reduce malnutrition by half by 2010 (MKUKUTA) or even 2015 (MDG).

11. **Effective nutrition interventions exist.** Breastfeeding promotion, integrated child care programs and pre-school programs aimed at young children have each proved to be effective in addressing malnutrition. Vitamin A deficiency amongst children under the age of 5 can be effectively addressed through a twice yearly vitamin A supplementation. Requiring all salt to be iodized helps prevent iodine deficiency. Iron supplementation for and intermittent presumptive treatment for malaria in pregnant women, the provision of deworming tablets to children under five, sleeping under bed nets to prevent malaria, fortifying food with iron and cooking in iron pots are effective ways to reduce anemia.

12. **A number of nationwide interventions have been successfully introduced since the year start of the millennium.** Over 80% of children under the age of 5 receive twice a year vitamin A supplements and deworming tablets. At least three quarter of all households utilize salt fortified with iodine. These are important successes that have significantly contributed to the reduction of infant and child mortality and preventable mental and physical impairment.

13. **Nutrition interventions have attractive economic rates of return.** Many (but not all) nutrition interventions are good economics and have attractive benefit to cost ratios. At a discount rate of 3-5% the benefit cost ratios of most nutrition interventions exceed one, often by a factor 10 to 40. In other words, investments in nutrition yield benefits that are 10 to 40 times as much as the original investment. Spending on nutrition is an investment at par or better than investments in malaria control, trade liberalization or community managed water supply, programs that already receive considerable investments. Food fortification and the provision of micro-nutrient supplements in particular have been demonstrated to yield highly attractive economic rates of return.

| Table E.1 Estimates of benefit to cost ratios for Tanzanian nutrition programs |
|---------------------------------------------|------------------|
| Benefit-cost ratio                         |                  |
| Iodine fortification                       | 38.6             |
| Vitamin A supplementation (children<6y)    | 4.3 – 43 (*)     |
| Iron supplementation (per pregnant women)  | 9.4              |
| Breastfeeding promotion in hospitals       | 17.5             |
| Integrated child care programs             | 4.4 - 19.1       |
| Intensive pre-school program with considerable nutrition for poor families | 1.4-2.9 (*) |

**Note:** Benefit to cost ratios are based on empirical studies of nutrition interventions and subject to a number of assumptions. Calculations assume 3-5% discount rates and include both private and social costs. An asterix (*) indicates international evidence. All other evidence is from Tanzania.
14. **With the existing resources only the most crucial nutrition investments can be afforded.** The budget available for direct investments in nutrition from UNICEF, HKI and TFNC is limited – less than $0.75 per beneficiary per annum. With such limited resources, nutrition interventions have to be confined to those with the highest rates of return, in particular those addressing vitamin and mineral deficiencies and activities addressing prenatal care and care and feeding practices for young children. Yet much can be achieved even with the existing resources.

15. **The positive impact improving nutrition has on health and education outcomes supports leveraging resources from these sectors for nutrition.** Cost sharing with others will have to be an important element of a strategy aimed at improving nutrition outcomes. There are many opportunities to do so. For instance, behavioral change aimed at improving the quality of people’s diets could be supported by TACAIDS and the Ministry of Health and Social Welfare as good nutrition is of great importance in delaying the outbreak of AIDS for those infected with HIV and for ensuring that ARVs work effectively for those affected by AIDS. Similar opportunities exist with the Ministry of Health and Social Welfare as improved nutrition reduces the burden of diseases and reduces mortality, with the Ministry of Education and Vocational Training as good nutrition enhances school readiness and improves attention.

16. **Coordination with others could provide additional leverage for nutrition.** Districts will need to play a more central role in implementing nutrition activities, a role that will have to be facilitated by nutrition focal persons and field officers of the Ministries for Agriculture and Livestock Development and for Community Development, Gender and Children. A closer collaboration with ongoing interventions is possible, being it the promotion of hygiene and good sanitation (Water Sector and Sanitation Program), community based nutrition interventions (TASAF), or the promotion of home gardens and livestock keeping (Agricultural Sector Development Program). Collaboration with the private sector could go a long way in promoting food fortification (e.g. by fortifying maize flour, sugar or soft drinks with iron) and in marketing nutrition messages.

17. **Enhancing the efficiency of delivery and coordination mechanisms is another way to free resources for essential nutrition services.** Currently administrative costs absorb approximately one third of the budget available for nutrition interventions. By integrating nutrition interventions with ongoing activities, the cost of interventions would be reduced as only additional expenses would have to be covered. Other efficiency enhancing measures should also be considered. Enhancing efficiency requires reform which can only come about if the major actors in nutrition are committed to it: TFNC as the national institution charged with nutrition will have to provide leadership to ensure a coordinated, effective and efficient approach to tackling malnutrition.

18. **Strengthening TFNC is important for future interventions to be implemented successfully.** Vitamin A supplementation and salt fortification could be largely implemented from Dar es Salaam but decentralization and a greater reliance on (sector) budget support require a much greater focus on coordination and providing guidance and less on implementation. TFNC will need to be enabled to make this transition.
i. **To advance nutrition** the focus needs to be on a set of objectives that can be achieved within the available resources, while enhancing demand for nutrition services, strengthening the institutions key to delivering such services (TFNC and LGAs) and improving accountability. A number of concrete steps are proposed for consideration.

ii. **Focus nutrition services on the activities with the highest benefit-cost ratios,** in particular (i) vitamin and mineral provision and (ii) improved prenatal care and care and feeding practices for young children. The National Nutrition Strategic Plan should clearly prioritize these cost-effective interventions. Work programs of all nutrition partners (TFNC, LGAs, MoHSW as well as development partners) should then prioritize these actions and eliminate other strategies from their work programs.

iii. **The Ministry of Health and Social Welfare has to take full responsibility for nutrition outcomes.** The Ministry of Health and Social Welfare is responsible for many of the most effective nutrition interventions and as the parent ministry for TFNC bears final responsibility for achieving nutrition outcomes. Nutrition milestones could be identified in the Annual Joint Health Sector Review and the Health Sector Strategic Plan and should have clear targets for the delivery of vitamin A, salt iodization, anemia reduction and exclusive breastfeeding. A nutrition desk officer in the Ministry could provide in-house expertise and oversight and strengthen coordination with TFNC and could help to ensure that nutrition remains an integral part of the Ministry's disease prevention strategy.

iv. **Enhance domestic accountability and transparency by initiating an Annual Nutrition Review.** An Annual Nutrition Review which is accessible to all domestic stakeholders would provide an opportunity to report (and receive feedback) on progress in combating malnutrition, to discuss performance, to identify new demands and to agree on key priorities and milestones for the future work program.

v. **Establish a nutrition Sector Working Group to improve coordination and enhance efficiency.** By bringing together development partners in a nutrition Sector Working Group (SWG), nutrition will have a clearer 'home' in the work of Cluster II and in MKUKUTA monitoring, PER cluster work and the GBS annual review. A nutrition SWG will provide opportunities for dialogue and coordination and encourage development partners and NGOs to abide by the JAST principles and to align work programs, financing and technical assistance with the national nutrition agenda reducing the scope for inefficiencies and spending on non-priority areas.

vi. ** Improve service delivery by identifying and training nutrition focal points in all districts and holding them accountable for making progress.** Decentralization is an important aspect of making nutrition service delivery more effective and efficient as it brings implementation closer to the beneficiaries and creates demand for nutrition services from TFNC. With guidance from TFNC, nutrition focal points would be responsible for identifying the districts' key nutrition problems and hotspots, could be charged with assisting health, education and agriculture staff in designing nutrition interventions and integrating these in district plans and budgets. The focal person would have to report to TFNC to account for progress made in the delivery of nutrition services.
vii. **Enable TFNC to lead the national response to nutrition.** TACAIDS may serve as a model for a TFNC that provides strategic leadership and coordinates the implementation of a national multi-sectoral response to malnutrition. A strengthened TFNC would focus most of its attention to monitoring progress and providing guidance, training and technical support to various implementing agencies (MDAs and LGAs), and would reduce its role in implementation. Enabling TFNC to more effectively lead the national response to nutrition requires staffing in accordance with TFNC’s tasks and functions. The Public Service Reform Program II could facilitate this.

viii. **Create a department in TFNC, responsible for leveraging resources for nutrition through strategic leadership and coordination.** Addressing malnutrition requires a multi-sectoral effort. To ensure effective implementation TFNC has to collaborate intensively with various Ministries (Health and Social Welfare, Education and Vocational Training, Agriculture, Food Security and Cooperatives or Livestock Development, Ministry for Community Development, Gender and Children). TFNC will also have to provide strategic leadership on nutrition for various programs and project (TACAIDS, Malaria Initiative; TASAF, Water Supply and Sanitation program, Water Sector Development Program, Agricultural Sector Development Program) to share costs and to ensure the alignment of these programs with nutrition objectives.

ix. **Establish public-private partnerships and collaborate with NGOs to deliver nutrition services.** The availability of iodized of salt throughout Tanzania shows that it is possible to collaborate successfully with the private sector. Other opportunities for public-private partnerships exist for instance through social marketing of nutrition messages or by fortifying products like maize, sugar and cooking oil. Likewise volunteers or NGOs could be used to reach target population with nutrition messages and to implement nutrition related activities.

x. **Enhance demand for nutrition services, and instigate behavioural change through nutrition education.** Nutrition education is key to behavioural change, but will also increase the demand for nutrition services from service providers at local level (e.g. when pregnant women ask for advice at the clinic) or central level (when district nutrition officers request guidance from TFNC). Thailand which trained 1% of its population as volunteers to spread information about good nutrition has shown that remarkable results on a nationwide scale can be achieved through nutrition education alone.

xi. **Co-opt the HIV/AIDS program into a nutrition education campaign.** Good nutrition is particularly important for everyone, including those affected by HIV and AIDS. Most people are unaware of their HIV status so a nutrition education program will have to reach all Tanzanians. With its extensive resources and a program that is already supporting communication and behavioural change, the HIV/AIDS program is well suited to lead the implementation of the nutrition education agenda supported by TFNC will the necessary technical knowledge. Other programs such as the Water and Sanitation who are preparing to launch a campaign on the importance of hand washing with soap could also be approached.
xii. **Strengthen monitoring and evaluation.** Priorities for nutrition interventions, targeting mechanisms and progress against objectives can only be reliably assessed in the presence of information. Monitoring and evaluation systems for nutrition services need to be strengthened in particular to provide information at the local level, to assess the performance of micro-nutrient programs and to better understand behavioural patterns.

19. **For nutrition to be successfully advanced high level support is needed.** Efforts to advance nutrition in Tanzania have made before, with the earliest attempts dating back to the late 1970s. Most have not been very successful. To enhance the likelihood of success this time, commitment from all stakeholders is needed. A social 'contract' that is announced at a public event by a high level policy maker may be one way to commit the actors to change. Such a social contract would have to set clear objectives and a timeline, it would have to define roles and responsibilities of the various stakeholders and provide an accountability framework.
1. **HOW SERIOUS IS MALNUTRITION AND WHY DOES IT MATTER?**

1. Malnutrition remains one of the most serious health problems and the single biggest contributor to child mortality. It is a main inhibitor to educational performance and a key impediment to economic growth. Nobel Prize-winning economist Robert Fogel has estimated that improved nutrition, by bringing the ultra poor into the labor force, by raising the energy available for work, and by increasing the efficiency of the human body to transform dietary energy into work output, contributed to approximately 50% of the British growth in per capita income over the past 2 centuries (Fogel 2004). In other words about half of the remarkable rise of British per capita income from $205 in 1780 to $2544 in 1980 should be attributed to nutrition!1

2. This chapter explores the importance of nutrition for Tanzania. It demonstrates that the prevalence of malnutrition is very high. In fact, Tanzania appears to be affected by a double burden of malnutrition, with a very high incidence of undernourished children, but with a high prevalence of overweight and obese adults as well, particularly in urban areas. The chapter highlights the high (economic and welfare) costs associated to such high rates of malnutrition by discussing the consequence of malnutrition for infant mortality, education outcomes, the health system and labor productivity.

1.1 The prevalence of malnutrition in Tanzania is high

3. Good nutrition is pivotal for national development and the reduction of income poverty. This is recognized by the Millennium Development Goals (MDGs) and the MKUKUTA which pay considerable attention to the need to reduce the prevalence of undernutrition. Improving nutrition outcomes is not only a desirable goal in itself, it is a pro-poor policy as poor households are disproportionately affected. Reducing malnutrition is equity enhancing as it helps to avoid the reduction to opportunities to life as a result of reduced cognitive, mental and physical development. Addressing malnutrition is also good economics as inadequate nutrition affects educational attainment and leads to reduced labor productivity and lower incomes. Under-nutrition makes the human body susceptible to disease and addressing nutrition is an effective way to preventing illness and to reducing the private and public cost of health care. Improving nutrition is also an important way to reducing child mortality.

4. The goal set by the MDGs is to reduce to 15% (from 29% in 1992) the fraction of under five children that are underweight (see Box 1.1 for definitions). MKUKUTA sets itself an even more ambitious target of reducing to 20% by 2010 (from 44% in 1992) the proportion of stunted children (URT 2005). Much needs to be done to attain the MDG and MKUKUTA goals. In 2004, the year when the latest nation wide survey with a nutrition component was fielded, 38% of the children aged 0 to 59 months were stunted and 22% were underweight.

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1 Real domestic product at factor cost per capita in 1965 US$ (Maddison 1983).
5. The incidence of under-nutrition may be high but considerable improvements have been reported recently. Between 1999 and 2004 the percent of stunted children dropped from 44% to 38%. Better progress was recorded for underweight which fell from 29% to 22%. Of interest, but hard to explain, is the differential pattern in the reduction of malnutrition that has occurred between rural and urban areas. In urban areas nutrition outcomes improved over the 1990s (a reduction in stunting from 38% in 1991 to 25% in 1999), but stalled between 1999 and 2004. In rural areas the reverse has occurred. The prevalence of under-nutrition remained high and unchanged throughout the 1990s and dropped between 1999 and 2004.

6. The MDGs and MKUKUTA focus on anthropometric malnutrition (stunting and underweight). But Tanzanians are also affected by vitamin and mineral deficiencies such as iodine deficiency, iron deficiency or vitamin A deficiency. Over 40 different nutrients are essential to health and a diversified diet is important to ensure that a person consumes all nutrients in sufficient quantities. Fat soluble vitamins and nutrients, such as vitamin A, iron or iodine can be stored in the body and are used when needed. Other, water soluble, vitamins and nutrients like zinc can not be stored in the body and have to be consumed regularly. Vitamin and mineral deficiencies may result from inadequate intake of vitamin and mineral rich foods but could also come about because of an inadequate utilization of the available
vitamins and minerals by the human body because of infections or parasitic infestations. If a person is deficient in any one nutrient, health will be compromised. Vitamin and mineral deficiencies may manifest themselves through diseases such as beri-beri or kwashiorkor, can contribute to growth failure (stunting) and waste loss (wasting) and lead to childhood morbidity and mortality, a reduced ability to process information and lower labor productivity.

Box 1.1 Glossary

**Under-nutrition** refers to three internationally accepted indicators of malnutrition: stunting, underweight and wasting. These are anthropometric indicators of overall malnutrition. The indicators are normalized with respect to a WHO/NCHS reference population (see annex B). When the indices are less than one, two, and three standard deviations below the reference median, they are referred to as mild, moderate, and severe under-nutrition. Unless otherwise stated, all indices in this report are moderate stunting, underweight and wasting among children aged 0-59 months.

**Stunting** is an indicator for chronic under-nutrition, measuring the past growth failure of inadequate nutritional status due to many reasons including inadequate nutritional intake and poor health. Stunting is measured as height in relation to age and is referred to as height for age.

**Wasting** is an indicator for current or acute under-nutrition reflecting inadequate nutrition in the recent past due to, for example, seasonal food insecurity or acute infectious diseases such as diarrhea. Wasting is a measure of weight in relation to height and is referred to as weight for height.

**Underweight** is a composite measure of long- and short-term under-nutrition. It is measured as weight in relation to age and referred to as weight for age.

**Body mass index (BMI)** is measured as the body's weight in kilograms divided by height in meters squared (kg/m²). It is used for adults only and is an index of "fatness." Both high BMI (overweight, BMI greater than 25-29.9; obese, BMI of 30 and above and low BMI (thinness, BMI less than 18.5) are considered inadequate or undesirable.

**Malnutrition** refers to various forms of poor nutrition caused by a complex array of factors including dietary inadequacy, infections, and socio-cultural factors. Under-nutrition, as well as a BMI that is too high, as well as micro-nutrient deficiencies are forms of malnutrition.


7. Vitamin A is a good illustration of an essential nutrient that is often not available in sufficient quantities in the diet of Tanzanians. Vitamin A is important for the immune system and plays a role in maintaining the epithelial tissue in the body. Vitamin A deficiency is closely associated to infant mortality. A meta-analysis of eight mortality trials held across the globe found for instance that improving the vitamin A status of children aged six months to five years reduced mortality rates by about 23% in populations with at least low prevalence of clinical signs of vitamin A deficiency (Beaton et al. 1993). Severe vitamin A deficiency can cause eye damage and is a leading cause of childhood blindness. It also increases severity of infections such as measles and diarrhea and slows recovery from illness. Vitamin A deficiency is common in environments where fresh fruits and vegetables are not readily
available. Vitamin A can be stored in the liver and periodic dosing (every six months) with vitamin A supplements is a rapid, low cost method of avoiding the risk of Vitamin A deficiency (DHS 2005).

8. According to the 2005 DHS report only half the children in rural areas (52%) consumed fruits and vegetables rich in vitamin A in the previous day. In urban areas this is 61%. Since the year 2000, twice annual yearly campaigns aim to provide vitamin A supplements and deworming tables to all children aged 6 months to five years. In 2004, about half the children (46%, DHS 2005) did receive a vitamin A supplement in the previous 6 months. Other data from TFNC and HKI suggest that the coverage of vitamin A supplementation is around 80%-90%. Vitamin A is also given to women after delivery, to replenish their body stores and to assure sufficient amounts of vitamin A in breast milk. But only one in five women received the recommended single postpartum dose of vitamin A according to the 2004 DHS. Others estimate that the coverage was higher, 29% (TFNC 2004a), but low none the less.

9. Iodine is another nutrient that has serious effects on normal body growth and intellectual development if the body is deficient in it. Iodine deficiency is the most common cause of preventable mental retardation and brain damage. It decreases child survival, causes goiters, and impairs physical growth. Deficiency of iodine during pregnancy causes abortions, stillbirths, low birth weight infants, premature births, and congenital abnormalities such as cretinism, an irreversible form of mental impairment. Goiter, an enlargement of the thyroid gland, is a visible manifestation of severe iodine deficiency. The national prevalence of goiter was estimated at 7% among school children in 2004 (TFNC 2004b) but the aggregated prevalence masks a geographical pattern, as the prevalence of goiter in the Iringa and Rukwa regions exceeds 20%. Nevertheless, the current national prevalence reflects large improvements since the 1980s, when the national goiter prevalence was estimated at 25% (Kavishe 1993).

10. The principal cause of iodine deficiency is inadequate iodine in food and water. Since iodine cannot be stored by the body for long periods, small amounts are needed regularly. Where crops and grazing animals do not provide sufficient dietary iodine, food fortification and supplementation have proven to be highly successful and sustainable solutions. The fortification of salt with iodine is the most common method of preventing iodine deficiency. It is practiced in Tanzania. According to the 2004 DHS survey about 74% of all households use salt that is fortified with iodine.\(^2\)

11. Anemia is another nutrient related deficiency. It is characterized by a low level of hemoglobin in the blood and is an underlying cause for maternal mortality, spontaneous abortions, premature births and low birth weight. Inadequate iron status impairs brain development and decreases the ability of children to learn by adversely affecting language, cognitive and motor development. It also reduces labor productivity among adults. The most common cause of anemia is nutritional anemia resulting from inadequate dietary intake of nutrients such as iron, folate and vitamin B12. Anemia also results from sickle cell disease, malaria or parasitic infections. Anemia can be addressed through food fortification and iron

\(^2\) An iodine deficiency disorders evaluation survey conducted by the Tanzania Food and Nutrition Center (TFNC 2004b) estimated a comparable prevalence of iodized salt in households: 84%.
supplementation. Other interventions such as the use of insecticide treated bed nets, deworming every six months or the use of iron pots and pans have also been found to reduce anemia (DHS 2005; Adish et al. 1999; Borigato and Martinez 1998; Ruel 2001; Geerligs, Brabin and Omari 2003).

12. Anemia is a major health problem and is associated with 20% of the maternal deaths (Profiles 2006). In 2004 69% of rural children and 59% of children who live in urban areas were anemic. 48% of women aged 15-49 are anemic. Anemia is even higher among pregnant women (58% of pregnant women are anemic). 61% of all pregnant women received iron tablets or syrup, but only 10% takes it for the recommended 90+ days (DHS 2005).

13. Little is known about the prevalence of other micro-nutrient deficiencies in Tanzania, but the nature of most diets –undiversified, low in animal products and high in plant sources that are rich in anti-nutrients, makes it likely that zinc and vitamin B1 and B2 deficiency are a public health problem. According to estimates by the International Zinc Consultative Group, 37.5% of the Tanzanian population is at risk of inadequate zinc intake. This prevalence places Tanzania into the ‘high’ risk category for zinc deficiency. Lack of zinc is known to impair the immune system and especially children with marginal nutritional status are at significant risk of developing zinc depletion. Zinc in treatment of acute diarrhea is known to reduce its duration and severity, which is why in Tanzania zinc is currently being included in ORS packages.

1.2 Adult nutrition

14. For adults nutritional status is typically expressed by the Body Mass Index (BMI). Figure 1.3 presents the BMI for women in urban and rural areas for 1992 and 2004. It demonstrates that in urban areas approximately 8% of women are underweight and almost 34% are overweight, of which as many as 12% are obese. In rural areas being underweight is more of an issue as 10% of women are too thin and 13% overweight. Less than 2% of rural women are obese. National BMI data for adult men are not available, but information from Kagera suggests that thinness affects men and women equally, while overweight is mostly a female feature.

15. Underweight children and overweight adults are often found in the same households, supporting the premise that access to and availability of food at the household level are not the major causes for under-nutrition amongst children. For instance, 25% of the children of overweight or obese mothers are stunted. Of all stunted children 10% have a mother that is overweight or obese. Even children that are acutely malnourished (wasted) often have mothers with a BMI that exceeds 25: this happens to 10% of the wasted children. It is not necessarily surprising to find stunted children with overweight or obese mothers. Overweight is often due to high intakes of carbohydrates and calorie rich foods such as cassava, rice; nutrients that are insufficient to support a child’s growth.

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3 A trial in Zanzibar (Sazawal et al. 2006) found that iron supplementation in malaria endemic areas is effective for reduction of iron deficiency and anemia in iron deficient children, but also associated it with adverse increased risk of hospitalization (primarily due to malaria and infectious disease), and mortality.

4 There is also evidence that ties low birth weight to higher risks of obesity and non-communicable diseases later in life (see Gluckman and Hanson 2006)
Figure 1.3: Body mass indices of adults

<table>
<thead>
<tr>
<th>Nutritional status of adult women aged 15-49 years in 1992 and 2004</th>
<th>Density function of male and female BMIs (aged 19-65 years) in Kagera</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>2004</td>
</tr>
<tr>
<td>URBAN</td>
<td>RURAL</td>
</tr>
<tr>
<td><strong>UNDERWEIGHT</strong></td>
<td>6%</td>
</tr>
<tr>
<td><strong>OVERWEIGHT</strong></td>
<td>15%</td>
</tr>
<tr>
<td><strong>OBESO</strong></td>
<td>4%</td>
</tr>
</tbody>
</table>

**Source:** Author’s calculations using DHS 2004 and KHDS 1992-1994

16. Overweight and obesity cause health problems, reduce productivity and lead to economic costs just as under-nutrition does. Yet the characteristics of people affected by over nutrition are very different from those affected by under-nutrition. Overweight individuals are on average better educated, relatively wealthy and live in urban areas. This is demonstrated in Table 1.1 presenting a weighted regression of the BMI of women with their personal characteristics as regressors. The regression indicates how, on average, the BMI for women from the wealthiest quintile is two points higher than that for women from the poorest wealth quintile. Likewise, BMI in rural areas is lower than that in urban areas (by 0.77), while the BMI first declines with the level of education, but then increases when women attain more than 7 years of education.

17. An aspect of concern is the rapid increase in overweight between 1991 and 2004. The fraction of urban women that are overweight or obese almost doubled from 19% in 1991 to 34% in 2004 in part because the fraction of obese urban women tripled from 4% in 1991 to 12% in 2004. In rural areas increases are also observed, but to a much lesser extent. The increase in obesity appears to be a reflection of increasing wealth in Tanzania, while the diverging pattern between rural and urban areas suggests that inequality is on the rise.

18. In the remainder of this study the focus will be on under-nutrition and mineral and vitamin deficiencies as its economic and health consequences are most pressing and because under-nutrition disproportionately affects those with low incomes, limited education and living in conditions with poor sanitation facilities, no access to safe water and a high prevalence of infectious disease. That said it is alarming that in urban areas more than a third of urban women are overweight or obese. From a public health perspective it would be prudent to investigate its long-term implications.
Table 1.1: Regression of Body Mass Index of women on personal characteristics

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>T-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>20.9</td>
</tr>
<tr>
<td>D-2\textsuperscript{nd} wealth quintile</td>
<td>0.19</td>
</tr>
<tr>
<td>D-3\textsuperscript{rd} wealth quintile</td>
<td>0.32</td>
</tr>
<tr>
<td>D-4\textsuperscript{th} wealth quintile</td>
<td>0.73</td>
</tr>
<tr>
<td>D-5\textsuperscript{th} wealth quintile</td>
<td>2.05</td>
</tr>
<tr>
<td>D-rural (=1)</td>
<td>-0.77</td>
</tr>
<tr>
<td>Age</td>
<td>0.05</td>
</tr>
<tr>
<td>Education in years</td>
<td>-0.14</td>
</tr>
<tr>
<td>Education squared</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Note: Weighted OLS regression. The adjusted $R^2$ is 0.13. The number of observations is 4940.

Source: Author’s calculations using DHS 2004.

1.3 Malnutrition has high economic and welfare costs

19. Malnutrition bears high economic and welfare costs that roughly fall into four categories. Inadequate nutrition (i) increases mortality, (ii) increases susceptibility to disease (iii) lowers labor productivity and (iv) reduces school performance. This section addresses these four costs of malnutrition.

20. Malnutrition leads to high mortality. Malnutrition has a direct bearing on mortality as demonstrated by the fact that infant mortality is significantly higher for low birth weight newborns than for others. This is illustrated in Table 1.2 which demonstrates how infant mortality for small newborns is more than twice as high as for children of average birth weight or higher.\textsuperscript{5}

Table 1.2: Early childhood mortality rates by birth size

<table>
<thead>
<tr>
<th>Birth size</th>
<th>Neo-natal mortality (1\textsuperscript{st} month)</th>
<th>Post-neonatal Mortality (2\textsuperscript{nd} -12\textsuperscript{th} months)</th>
<th>Infant Mortality (1\textsuperscript{st} year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average for Tanzania</td>
<td>32</td>
<td>36</td>
<td>68</td>
</tr>
<tr>
<td>Small or very small at birth</td>
<td>86</td>
<td>44</td>
<td>131</td>
</tr>
<tr>
<td>Average or larger at birth</td>
<td>26</td>
<td>35</td>
<td>60</td>
</tr>
</tbody>
</table>


21. Pelletier et al. (1995) estimate that 56\% of child deaths in developing countries are attributable to the effects of malnutrition. Importantly, the relationship between malnutrition and mortality holds not just for the severely malnourished, it equally applies to the moderately and mildly malnourished. On average a child who is severely underweight is 8.4

\textsuperscript{5} Birth weight is based on recall by mothers. There is a very high correlation between birth size as reported by mothers and birth weight as reported on the birth cards—for those with birth cards. Note however, that as birth size is based on recall, there is scope for selection bias whereby mothers whose child has passed away are more likely to report that the child was small or very small at birth.
times more likely to die from infectious diseases than a well nourished child. Children who are moderately underweight and mildly underweight are 4.6 and 2.5 times respectively more likely to die than well nourished children. Although the risk of death is greater for severely underweight children, they make up only a small fraction of the total number of children suffering from malnutrition, so that to reduce the risk of dying it is effective to address all malnourished children.

Box 1.2: Malnutrition affects survival, productivity and intelligence in different ways

Under-nutrition affects health, survival, productivity and school performance in different ways. Below is a schematic overview of how nutrition deficiencies affect the prospects of young children.

<table>
<thead>
<tr>
<th>Deficiency</th>
<th>Leads to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate breastfeeding</td>
<td>Mortality and Disease</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>Labor Productivity</td>
</tr>
<tr>
<td>Wasted, stunted, underweight</td>
<td></td>
</tr>
<tr>
<td>Low birth weight</td>
<td>School performance and intelligence</td>
</tr>
<tr>
<td>Iron</td>
<td></td>
</tr>
<tr>
<td>Iodine</td>
<td></td>
</tr>
</tbody>
</table>

Source: Adjusted from Profiles 2006.

22. The strong association between under-nutrition and mortality reported internationally is also found for Tanzania. There is a strong association at the regional level, between the prevalence of stunting and under five mortality (Figure 1.4). It is estimated that about 36% of all child deaths beyond early infancy are due to under-nutrition, making it the single greatest cause of child mortality (Profiles 2006).

23. Vitamin and mineral deficiencies are a major cause of mortality too. It has been demonstrated that distributing vitamin A on a semiannual basis can reduce overall child mortality by about 23% (Beaton et al. 1993). Based on this international evidence one expects that the provision of vitamin A on a national scale which started in Tanzania in 1987 but whose coverage was increased from the year 2000, is one of the reasons behind the drop in infant mortality rates from 156 in the period 1995-1999 to 112 between 2000-2004. Amongst adults and pregnant women in particular, iron deficiency is of concern as the risk of maternal death is substantially elevated for anemic women: over a fifth of all maternal deaths are associated with anemia (Brabin, Hakimi and Pelletier 2001).
24. **Malnutrition increases susceptibility to disease.** Malnutrition increases the risk of illness and leads to a vicious cycle with impaired immunity leading to infection with attendant loss of appetite and increased catabolism and, thus, an increased likelihood of additional malnutrition (Behrman, Alderman and Hoddinott 2004). Malnutrition is a fundamental factor contributing to malaria-associated morbidity and anemia (Ehrhardt et al. 2006). Low birth weight, under-nutrition and vitamin and mineral deficiencies have been identified as the single largest risk factor contributing to the burden of disease in developing countries. Underweight alone is held responsible for 9.5% of global burden of disease. Iron, vitamin A, and zinc deficiencies add another 6.2% (Ezzati et al. 2002). And children with low birth weight have been found to stay longer in hospital in circumstances where births occur in such settings, have higher risks of subsequent hospitalization and make more frequent use of outpatient services (Victoria et al. 1999).

25. Increased morbidity has direct resource costs for the health care system and for those affected by disease through lost income or schooling. The costs of malnutrition related diseases to the health system are high especially given the small available budget for public health care (of approximately $ 12 per capita per annum). Preventing disease through a reduction in malnutrition would not only free budgetary resources it would also ease the workload on the small contingent of trained medical staff that is available in Tanzania. The costs of illness to individuals and households are equally high. Using a cross section from Kilimanjaro, Christiaensen, Hofmann and Sarris (2004) find that serious adult illness reduces per capita consumption by 17%. Using panel data from Kagera it was demonstrated that chronic illness leads to a 6% decline in consumption growth (Hoogeveen 2005).

26. **Malnutrition reduces labor productivity.** The basis for productivity losses as an adult due to decreased body size, strength and endurance is laid in early childhood when malnutrition leads to retarded physical growth. Catching up is difficult as is illustrated in Figure 1.5. It presents anthropometric information that was collected from individuals in the Kagera region in 1994 and 2004. The figure demonstrates that children who were stunted in
1994 are more likely to be short 10 years later. The older a child is when it is stunted the greater the gap with non-stunted peers 10 years later.

**Figure 1.5: Height in 2004 and childhood stunting 10 years earlier; Kagera.***

![Graph showing height in 2004 and childhood stunting 10 years earlier.](image)

**Source:** Alderman, Hoogeveen and Rossi 2006b.

27. Height has unequivocally been shown to be related to productivity (Behrman, Alderman and Hoddinott 2004). A number of studies estimate the economic cost of growth retardation. Thomas and Strauss (1997) estimate the direct impact of adult height on wages for those in urban Brazil who work in the market sector and find that a 1% increase in height leads to a 2-2.4% increase in wages or earnings. Hunt (2005) reports that a 1% loss in adult height as a result of childhood stunting is associated with a 1.4% loss in productivity. And an earnings regression for Kagera demonstrates that an additional 1cm in height increases income by 1.8% (Alderman, Hoogeveen and Rossi 2006a).

28. Micronutrient status also has important productivity effects. Vitamin A deficiency can cause blindness with obvious consequences for productivity. Anemia is also associated with reduced productivity, though the magnitude depends on the nature of the task. Eliminating anemia was calculated to result in a 5 to 17% increase in adult productivity which adds up to 2% of GDP in the worst affected countries (Strauss and Thomas 1998; Horton and Ross 2003). For many low-income Asian countries, productivity losses due to the high prevalence of under-nutrition amounts to more than of 2-3% of GDP per annum, even without considering the consequences of long-term productivity losses due to developmental and cognitive impairment (Horton 1999).

29. **Malnutrition decreases education performance.** Malnutrition has a negative impact on schooling outcomes. There are at least two ways in which nutrition can affect education. First, malnourished children may receive less education. This may be because their caregivers seek to invest less in their education, because schools and parents use physical size as a rough indicator of school readiness leading to later enrollment or because malnourished children may have higher rates of morbidity and thus greater rates of absenteeism from school and learn less while in school.⁶

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⁶ This section is based on Behrman, Alderman and Hoddinott, 2004.
30. Another pathway from malnutrition to educational outcomes is via the capacity to learn, a direct consequence of the impact of poor nutrition on cognitive development. Maternal iodine deficiency, for instance, has negative and irreversible effects on the cognitive functioning of the developing fetus. Postnatal iodine deficiency is also associated with cognitive deficits (Black 2003): iodine-deficient children have been shown to have IQs that are, on average, 13.5 points lower than iodine-sufficient children (Grantham-McGregor, Fernald and Sethuraman 1999) and iron deficiency anemia has been associated with half a standard deviation reduction in IQ (Horton and Ross 2003).

31. These three pathways interact. A child with reduced ability to learn is likely to spend less time in school and to learn less while in class. A hungry or anemic child is less likely to pay attention in school. In combination these three pathways lead to significant costs. Glewwe and Jacoby (1995) demonstrate for Ghana that for each year of delay in entry to primary school a child loses 3% of lifetime wealth. A study in Zimbabwe (Alderman, Hoddinott and Kinsey 2006) shows that by adolescence, malnourished children would be 4.6 centimeters smaller and completed 0.7 grades of schooling less. As a consequence lifetime income earnings are reduced by 12-17%.

32. Alderman, Hoogeveen and Rossi (2006b) investigated for the Kagera region the impact of early childhood malnutrition on school achievement and earnings (Figure 1.5). They find that malnourished children enter school approximately 1 year later and lose up to two years of education compared to their well-nourished peers. Severely malnourished children (80% of the median) have a four times higher probability not to attend school than non-malnourished children. As a consequence of the delayed school entry and lower educational attainment lifetime income earnings for children whose nutritional status is 85% of the median reference child are reduced by 3% relative to a child whose nutritional status is 95% of the reference child. The loss in lifetime earnings increases to 12% if the impact of height on future earnings is taken into consideration.

Figure 1.6: Education in Years in 2004 and childhood stunting 10 years earlier; Kagera.

Source: Alderman, Hoogeveen and Rossi 2006b.
1.4 Conclusion

33. In this chapter the prevalence and types of malnutrition that affect Tanzania were discussed. Malnutrition comes in different guises. It can be observed from children that are too small for their age or too thin for their height and can result from inadequate intake of calories, and essential vitamins and minerals. Malnutrition also comes in the form of being overweight and obese. It is found that the incidence of the various types of malnutrition is very high. Up to 40% of children in rural areas are stunted, approximately half the population is anemic and more than one in three urban women is overweight or obese.

34. The economic and social costs of these various types of malnutrition are high. Malnutrition leads to excess maternal, infant and child mortality, contributes considerably to the burden of disease and negatively affects the ability to learn and to work.

35. Malnutrition is a scourge but its high incidence presents opportunities too. Malnutrition can be addressed through policy measures, oftentimes quite successfully so, and with limited means. The iodization of salt and the provision of vitamin A and deworming tablets demonstrate this forcefully. The high incidence of malnutrition thus presents an opportunity to enhance school performance, reduce maternal and infant and child mortality and to improve the ability of the labor force to be productive.

36. The remainder of this study will consider what can and needs to be done to bring the benefits of addressing malnutrition within reach. To this end, chapter two will provide a profile of malnutrition. Chapter three will then consider the causes of malnutrition, which helps determining the substance of interventions. Chapter four discusses the budgetary implications of interventions along with their rate of return. Chapter five, finally, discusses how to enhance the effectiveness and efficiency of the actors operating in the nutrition sector.
2. PROFILE OF MALNUTRITION

37. The prevalence of malnutrition in Tanzania is alarming on average and is characterized by considerable variation between rural and urban areas, between regions and between socio-economic groups. Interventions that aim to address malnutrition will need to take these differences into account, in order to make efficient use of resources.

38. This chapter considers various aspects of relevance to targeting. It considers spatial differences in the incidence and types of malnutrition. It also discusses how the prevalence of malnutrition varies between households of different wealth. And the chapter considers the timing when under-nutrition manifests itself, showing that most harm is done before a child is born or during the first two years of life.

2.1 Under-nutrition varies spatially

Figure 2.1: Malnutrition in 2004 for children under 5 years of age

![Graph showing malnutrition data]

Source: Author's calculations using DHS 2004 data

39. Nutrition outcomes differ considerably between rural and urban areas. The prevalence of under-nutrition in rural areas exceeds urban prevalence rates by 40-50% (Figure 2.1). Out of a hundred children, 40 in rural areas are stunted as opposed to 25 in urban areas. The fraction of underweight children is 23% in rural areas and 17% in urban areas. Nutrition outcomes also differ between regions. The percentage of stunted children varies from 17% in Dar es Salaam and 23% in Kilimanjaro to more than three times as much in Lindi (54%). Comparable variations are found for underweight (13% in Mwanza, 32% in Tanga) and wasting (0.4% in Ruvuma, 6.8% in Pwani).
Table 2.1: Spatial variation in key nutrition indicators

<table>
<thead>
<tr>
<th></th>
<th>Children aged 6-59 months with any anemia</th>
<th>Children aged 6-59 not eating vit. A supplement in past 6 months</th>
<th>Children under 3 not eating during past day vit. A rich food.</th>
<th>Adequately iodized salt not available in household</th>
<th>Stunted children under 5.</th>
<th>Underweight children under 5.</th>
<th>Wasted children under 5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanzania</td>
<td>71.8</td>
<td>54.5</td>
<td>46.3</td>
<td>56.6</td>
<td>37.7</td>
<td>21.8</td>
<td>3.0</td>
</tr>
<tr>
<td>Dodoma</td>
<td>66.4</td>
<td>33.0</td>
<td>48.3</td>
<td>76.8</td>
<td>44.4</td>
<td>30.4</td>
<td>3.9</td>
</tr>
<tr>
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<td>6.5</td>
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<td>55.6</td>
<td>43.5</td>
<td>61.6</td>
<td>35.8</td>
<td>15.6</td>
<td>2.2</td>
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<tr>
<td>Pwani</td>
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<td>40.6</td>
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<td>36.8</td>
<td>26.8</td>
<td>6.8</td>
</tr>
<tr>
<td>Dar es Salaam</td>
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<td>31.7</td>
<td>12.7</td>
<td>16.9</td>
<td>14.3</td>
<td>4.1</td>
</tr>
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<td>89.7</td>
<td>54.0</td>
<td>23.7</td>
<td>2.6</td>
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<td>58.5</td>
<td>28.7</td>
<td>95.4</td>
<td>52.7</td>
<td>29.1</td>
<td>1.8</td>
</tr>
<tr>
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<td>57.1</td>
<td>29.6</td>
<td>81.7</td>
<td>50.4</td>
<td>24.7</td>
<td>0.4</td>
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<td>71.5</td>
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<td>44.3</td>
<td>37.6</td>
<td>15.1</td>
<td>1.5</td>
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<td>40.6</td>
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<td>87.3</td>
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<td>5.2</td>
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<td>Tabora</td>
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<td>74.8</td>
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<td>34.0</td>
<td>19.9</td>
<td>2.6</td>
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<tr>
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<td>82.2</td>
<td>48.0</td>
<td>54.3</td>
<td>45.1</td>
<td>24.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Kigoma</td>
<td>76.3</td>
<td>35.9</td>
<td>55.3</td>
<td>50.8</td>
<td>50.1</td>
<td>34.2</td>
<td>3.7</td>
</tr>
<tr>
<td>Shinyanga</td>
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<td>54.7</td>
<td>61.7</td>
<td>37.4</td>
<td>19.3</td>
<td>1.9</td>
</tr>
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<td>58.2</td>
<td>62.8</td>
<td>61.7</td>
<td>37.3</td>
<td>25.4</td>
<td>3.6</td>
</tr>
<tr>
<td>Mwanza</td>
<td>82.8</td>
<td>60.6</td>
<td>54.0</td>
<td>51.7</td>
<td>30.6</td>
<td>12.8</td>
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<tr>
<td>Mara</td>
<td>79.2</td>
<td>55.8</td>
<td>53.5</td>
<td>26.8</td>
<td>38.7</td>
<td>16.7</td>
<td>0.8</td>
</tr>
<tr>
<td>Manyara</td>
<td>55.6</td>
<td>57.1</td>
<td>47.0</td>
<td>54.4</td>
<td>39.6</td>
<td>30.6</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Source: DHS 2005. Note Zanzibar is omitted due to the small number of observations.

40. What holds for anthropometric nutrient deficiencies also holds for vitamin A and mineral deficiencies. In Lindi, Mtwara, Iringa and Pemba North for instance, less than 10% of all households use adequately iodized salt as opposed to more than 80% in Dar es Salaam and more than 90% in Arusha. The consumption of fruits and vegetables rich in vitamin A by children under 3 varies by region and ranges from 71% in Mtwara to 32% in Pemba South. Likewise, 67% of children in Dodoma received vitamin A supplementation, but only 18% in Rukwa.

41. Not only do prevalence rates differ between regions, there is substantial variation in the type of nutritional problem that affects regions. A region that performs well in one aspect may perform poorly in others. Dar es Salaam for instance, does well on iodization, stunting and underweight and belongs to the top five regions in Tanzania (Table 2.2). At the same time Dar es Salaam has a prevalence of wasting that is 30% above the national average.
Mwanza does poorly on anemia and the distribution of vitamin A supplements, but is one of the best performers in stunting and underweight. Similar divergences can be observed for Mtwara, Mara, Iringa or Kigoma.

**Table 2.2: Five worst and five best performing regions**

<table>
<thead>
<tr>
<th>Children with any anemia (%)</th>
<th>Children that did not receive a vitamin A tablet in previous 6 months (%)</th>
<th>Children that did not consume fruits or vegetables rich in vitamin A (%)</th>
<th>Households without adequately iodized salt (%)</th>
<th>Stunted children (%)</th>
<th>Underweight children (%)</th>
<th>Wasted children (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Worst performing districts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lindi</td>
<td>Rukwa</td>
<td>Kagera</td>
<td>Mtwara</td>
<td>Lindi</td>
<td>Kigoma</td>
<td>Pwani</td>
</tr>
<tr>
<td>Mwanza</td>
<td>Tabora</td>
<td>Kigoma</td>
<td>Lindi</td>
<td>Mtwara</td>
<td>Tanga</td>
<td>Tanga</td>
</tr>
<tr>
<td>Shinyanga</td>
<td>Mbeya</td>
<td>Shinyanga</td>
<td>Singida</td>
<td>Iringa</td>
<td>Manyara</td>
<td>Kilimanjaro</td>
</tr>
<tr>
<td>Mtwara</td>
<td>Tanga</td>
<td>Mwanza</td>
<td>Iringa</td>
<td>Ruvuma</td>
<td>Dodoma</td>
<td>Singida</td>
</tr>
<tr>
<td>Mara</td>
<td>Lindi</td>
<td>Kilimanjaro</td>
<td>Ruvuma</td>
<td>Kilimanjaro</td>
<td>Mtwara</td>
<td>Manyara</td>
</tr>
<tr>
<td><strong>Best performing districts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanga</td>
<td>Pwani</td>
<td>Singida</td>
<td>Mbeya</td>
<td>Tabora</td>
<td>Mara</td>
<td>Rukwa</td>
</tr>
<tr>
<td>Manyara</td>
<td>Singida</td>
<td>DSM</td>
<td>Mara</td>
<td>Mwanza</td>
<td>Morogoro</td>
<td>Mbeya</td>
</tr>
<tr>
<td>Arusha</td>
<td>Shinyanga</td>
<td>Pwani</td>
<td>Kilimanjaro</td>
<td>Arusha</td>
<td>Mbeya</td>
<td>Iringa</td>
</tr>
<tr>
<td>Kilimanjaro</td>
<td>Kigoma</td>
<td>Ruvuma</td>
<td>DSM</td>
<td>Kilimanjaro</td>
<td>DSM</td>
<td>Mara</td>
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<tr>
<td>Iringa</td>
<td>Dodoma</td>
<td>Mtwara</td>
<td>Arusha</td>
<td>DSM</td>
<td>Mwanza</td>
<td>Ruvuma</td>
</tr>
</tbody>
</table>

*Source: Author’s calculations using DHS 2004*

42. Planners and policy makers need to take into account the divergence in the prevalence and types of malnutrition when preparing nutrition interventions. Planning in the face of large geographic differences requires good information about local conditions and a management information system that is able to capture it. It calls for caution in applying uniform, nationwide, approaches. A decentralized approach to nutrition interventions, backed up by national expertise, and guidance, coordination and knowledge sharing seems an appropriate way to address these issues. This is so in particular as regions are non-homogeneous as well. Differences between regions carry over to differences within regions. Of the differences in the levels of stunting one finds between regions, 80% can be attributed to within region differences (that is differences in the incidence of stunting between districts, villages and households) while 20% differences can be attributed to differences between regions. This is illustrated in Table 2.3 which presents a decomposition of the differences in the incidence of stunting between regions whereby differences are expressed as inequality measures (measured as General Entropy (GE) and Atkinson (A)) with various degrees of sensitivity to inequalities between those with the highest and lowest levels of stunting.
Table 2.3: Decomposition of differences in stunting within and between regions

<table>
<thead>
<tr>
<th></th>
<th>GE(-1)</th>
<th>GE(0)</th>
<th>GE(1)</th>
<th>GE(2)</th>
<th>A(0.5)</th>
<th>A(1)</th>
<th>A(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within regions</td>
<td>83%</td>
<td>80%</td>
<td>78%</td>
<td>78%</td>
<td>78%</td>
<td>77%</td>
<td>73%</td>
</tr>
<tr>
<td>Between regions</td>
<td>17%</td>
<td>20%</td>
<td>22%</td>
<td>22%</td>
<td>22%</td>
<td>23%</td>
<td>27%</td>
</tr>
</tbody>
</table>

Source: Author’s calculations using DHS 2004

43. What holds for regions carries over to communities. Figure 2.2 presents the fraction of stunted children per village for 198 rural villages in which for at least 15 children anthropometric measures were taken. Moving from left to right the graph suggests that in about a quarter of all communities less than 25% of children are malnourished, that in about fifty percent of the communities between 25% and 50% of children are malnourished and that in another 25% more than 50% of the children are undernourished. In other words the efficiency (and rate of return) of a community wide nutrition program would improve by more than a factor two if interventions in villages with relatively low incidence of malnutrition were shifted to villages with a high incidence of malnutrition.

Figure 2.2: Prevalence of stunting in 198 rural villages communities in Tanzania

Source: Author’s calculations using DHS 2004.

44. Decentralization will allow addressing such divergences. It has long been on the agenda, and goes as far back as 1980 when there was an attempt to put nutritionists in every district. Recently the move towards decentralization in nutrition has received new impetus and there is an agreement between TFNC and PMO-RALG to identify nutrition focal points in all districts. These focal points will be responsible for planning and budgeting for nutrition and implementing nutrition related activities, but will also need to account on progress achieved.
Box 2.1: Mismatches in targeting

While most countries do not scale up nutrition programs to any reasonable level, many do scale up the wrong kinds of programs or interventions. Three mismatches between the need or the cause of malnutrition and the design of programs were identified in India and are common across many other programs:

- **The "food first" mismatch:** Many nutrition programs focus on food security and food supplementation in situations where unhealthy living conditions, poor child-care practices are an undiversified diet are the main causes of malnutrition.

- **The age-targeting mismatch:** Most under-nutrition happens during pregnancy and the first two years of life, and most of this early damage cannot be reversed (chapter 2). Yet many programs continue to expend large resources on other age groups.

- **The poverty-targeting mismatch:** It is widely believed that under-nutrition is strongly concentrated with income poverty. The analysis of chapters 1 and 3 shows that this is not the case for Tanzania. Rather there are huge spatial differences in the prevalence of under-nutrition. Programs therefore best target mal-performing geographic areas. For iodine interventions and the post-partum vitamin A supplementation would, however, benefit from poverty targeting.

Source: Adapted from Repositioning Nutrition, World Bank 2006.

2.2 Household wealth is not a good predictor for malnutrition

45. Household wealth and malnutrition are by no means synonymous. This is demonstrated in Figure 2.3 presenting incidence curves for different types of malnutrition. If malnutrition were equally distributed across the population, the incidence curve would coincide with the 45-degree line: i.e. the 10% poorest households are affected by 10% of stunting, the 20% poorest households have 20% of all stunted children etc. The curves for being stunted and being underweight lie slightly above the 45-degree line demonstrating that under-nutrition affects children from poorer households disproportionately. The degree to which this happens is modest, however. The curves for having given birth to a child that is small or very small and for having received vitamin A supplementation are approximately the 45-degree line, suggesting that low birth weight and vitamin A supplementation affect households from different wealth classes equally. But in access to iodized salt and the provision of vitamin A within 2 months after birth poor households are disadvantaged relative to wealthier households. For instance 26% of households in the poorest quintile use adequately iodized salt, as opposed to 72% of those in the wealthiest quintile.

46. The conclusion that can be inferred from these graphs is that malnutrition affects everybody and that household wealth is not a good predictor for nutritional status. Only in connection to purchased inputs (iodized salt) or inputs that need to be actively sought (postpartum follow up at health centers) are poor households disadvantaged relatively to wealthier ones. Positive is the fact that campaign type interventions –such as the provision of vitamin A and deworming tablets reach children irrespective of their wealth background.

---

7 An incidence curve presents on the horizontal axis the cumulative ranking of all households by wealth. On the vertical axis it presents the cumulative ranking of the incidence of a certain type of malnutrition.
Figure 2.3: Incidence curves of under-nutrition

- Incidence of stunted children
- Incidence of underweight children
- Incidence of babies small at birth
- Incidence of adequately iodized salt
- Incidence of vitamin A supplementation
- Incidence of vitamin A supplementation within 2 months after giving birth

Source: Author’s calculations using DHS 2004

47. Figure 2.4 delves deeper into the weak association of wealth and malnutrition by illustrating under-nutrition rates by wealth quintile, separately for rural and urban areas. It demonstrates that in rural areas, where 80% of all Tanzanians live and which dominates the national incidence curves, the incidence of stunting and underweight does not vary by wealth class, with the exception for children living in households in the top 20% wealthiest.
households. But even amongst the wealthiest rural households, more than 30% of all children are stunted and 17% are underweight. In urban areas there is a more explicit association between households. But even amongst 20% wealthiest urban households about 12% of children are stunted. An implication that can be drawn from this is that poverty targeting (as opposed to spatial targeting) is not a very effective way of rationalizing nutrition interventions in Tanzania.

Figure 2.4: Under-nutrition in 2004 for children under 5 years by rural areas and urban areas

Source: Author's calculations using DHS 2004

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8 In rural settings the livelihood groups (pastoralist, agro-pastoralists and agriculturalists) is often found to be more important than income class. Pastoralists, because of the consumption of animal protein (especially milk) have more lean tissue and are therefore taller.
48. Household wealth may not be a good predictor for under-nutrition, this should not be taken as evidence of the absence of a relation between income and nutritional status. In fact, there is solid evidence to support the contrary. Studies for Tanzania by Alderman, Hoogeveen and Rossi (2006a) and by Abdulai and Aubert (2004) find a significant negative relation between household income and the prevalence of malnutrition. The regression presented in chapter 3 demonstrates a significant relation between household wealth and the incidence of malnutrition.

49. Possibly the weak association between income and malnutrition in rural areas should be taken as evidence of the depth of poverty outside urban localities. Monthly income for a household in the fourth wealth quintile in rural areas is as high (low would be more accurate) as the monthly income of an urban household in the second wealth quintile (Table 2.4). That malnutrition only starts to drop in rural areas from the fifth quintile and in urban areas between the second and the third quintile suggests the existence of an income threshold below which additional income will not result in reduced malnutrition. It is beyond the scope of this study to explore whether such a threshold exists and if it exists where is lies, but a comparison of Figure 2.4 with Table 2.4 is at least suggestive of the notion that up to Tsh 100,000 (or $100) per household per month, malnutrition rates are unresponsive to income. When incomes rise above this threshold, nutrition outcomes appear to improve.

<table>
<thead>
<tr>
<th>Table 2.4 Monthly household consumption by wealth quintile (Tsh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quintile</td>
</tr>
<tr>
<td>Dar es Salaam</td>
</tr>
<tr>
<td>Outside Dar es Salaam</td>
</tr>
</tbody>
</table>

Note: Assumed is an inflation of 25.4% between 2000 (when the HBS was collected) and 2005. In 2005 the Tsh / $ exchange rate was approximately 1000 / 1. Average household size for households in Dar es Salaam is 4.3. It is 5.0 for households outside Dar es Salaam.

Source: Author’s calculations using HBS 2000/1.

50. Finally, another way to appreciate the weak association between poverty and under-nutrition, and the large variation in under-nutrition between regions is by considering spatial patterns. This is done in Figure 2.5. It presents a clear geographic pattern, demonstrating that stunting is worst in Southern and Western Tanzania. The pattern for income poverty is quite different and the highest incidences of poverty are found in the Central Region and around Lake Victoria.
2.3 Under-nutrition starts early

51. Following birth the first two years of life are critical for good nutrition and young children need to be provided with sufficient calories as well as a diverse diet to support the fast rate of growth that occurs during this period of life. Children under the age of two are especially vulnerable to under-nutrition, as they are less able to express their needs and because they are susceptible to disease. Many children end up with their needs only partially met and under-nutrition typically manifests itself during this period. This is illustrated in Figure 2.6, showing how during the first 20 months of life the average z-score for children drops. This holds for all three anthropometric measures of under-nutrition, and in both urban and rural areas.

52. With the drop in z-scores following birth the fraction of stunted (but the same holds for wasted and underweight) children increases rapidly to stabilize between 30% (urban areas) and 40% (rural areas) at the age of two. The increase in malnutrition during this very early stage in life is especially damaging as it is during this critical period of life that most of the (irreversible) damage to physical growth, brain development, and human capital formation occurs. The period starting with pregnancy and the first 20 months therefore presents itself as an excellent window of opportunity to address under-nutrition and greatly facilitates to ability to target interventions.
Figure 2.6: Under-nutrition by age in months for urban and rural areas

Smoothed z-scores by age in months: urban

Smoothed z-scores by age in months: rural

Source: Author’s calculations using DHS 2004

53. The process of under-nutrition starts early, sometimes even before a child is born. According to estimates from the early 1990s, which represent the most recent nationally-representative data, 16% of pregnancies in Tanzania give rise to a newborn with low birth weight (<2500 g). More recent data from seven districts indicate that the prevalence of low birth weight ranged from 7.8% to 21% in those districts (TFNC 2002). The ramifications of low birth weight are manifold. During the neonatal period, newborns with birth weights between 2,000 and 2,500 grams have a four-fold increased risk of death compared to newborns weighing 2,500 to 3000 grams and a ten-fold increased risk of death compared to newborns weighing 3,000 to 3,500 grams. And, these elevated mortality risks extend into infancy (Ashworth, 1998). Infants born with low birth weight who survive their early childhood are more prone to experience developmental delays and are hence more likely to be stunted or underweight. When these children reach adulthood, they may suffer an increase risk of various adult chronic diseases (Barker 1998).
54. Low birth weight is less a consequence of poverty (see section 2.2.) and is caused by poor maternal nutrition, anemia, malaria, diarrhea, sexually transmitted diseases and disease such as schistosomiasis (World Bank 2006). It is also associated with inadequate nutrition of the previous generation. Undernourished mothers are more likely to give birth to low birth weight infants. This is illustrated in Figure 2.7 which shows how the prevalence of small babies is higher (by about 50%) amongst the 10% shortest women than it is amongst the 10% tallest women. The 10% shortest women give birth to 14% of all small of very small children. The 10% tallest women give birth to 9% of all small and very small children. An implication that can be drawn from this is that targeting pregnant mothers and children under the age of two is an effective way of implementing nutrition interventions in Tanzania.

2.4 Conclusion

55. In this chapter aspects of relevance to targeting nutrition interventions were discussed. There exists considerable spatial variability in the type and degree of malnutrition in Tanzania. This variability is found between rural and urban areas, between regions, between districts and also within districts between communities. The analysis demonstrates that malnutrition has the potential to affect everybody. Poor households are somewhat more affected than non-poor households but wealth differences only account for relatively small differences in the incidence of malnutrition. Especially in rural areas, where the majority of Tanzanians live, are people affected irrespective of their wealth. It has also been noted that (irreversible) malnutrition starts early in life, typically during pregnancy or in the first 20 months after birth.

56. These findings send a clear message for the organization of nutrition interventions. Decentralized implementation that is able to do justice to the variability in type and spatial incidence of malnutrition is extremely important if nutrition program are to be delivered in an effective and efficient manner. The findings also demonstrate that poverty targeting is not effective, especially in rural areas. Spatial targeting and age related targeting with a focus on children under the age of two present good opportunities. Pregnant women should also be targeted. But as most women become pregnant at one point in life, targeting those reaching gestational age could be equally effective.
57. In the next section the analysis will turn towards the causes of malnutrition as this will provide insights in the substance of nutrition interventions.
3. **CAUSES OF MALNUTRITION**

58. The conceptual framework that is often used to discuss the causes of malnutrition (UNICEF 1990) considers malnutrition an outcome of multiple factors: the most immediate causes are inadequate dietary intake and ill health. In turn, these immediate factors are determined by three underlying determinants: food energy availability and dietary diversity, caring practices for children and (pregnant) women, and the quality of living conditions.

59. This chapter considers empirically the importance of the three underlying determinants, food energy availability, caring practices and living conditions. It does so by relying on data from the 2001 Household Budget Survey and the 2004 Demographic and Health Survey. None of these surveys was designed specially for nutrition, yet in combination the two surveys provide sufficient material to get a reasonable sense of the importance of each of the three factors.

3.1 **Food energy consumption and dietary diversity are inadequate**

60. Chapter two has shown how very young children are most susceptible to undernutrition. A prevalence rate of stunting (an indicator of chronic malnutrition) of almost 40%, demonstrates that many children do not consume the required amount of calories. Whereas this seems to suggest that inadequate food availability is an important determinant for malnutrition, an undiversified diet, inadequate feeding and caring practices and unhealthy living conditions are considered the underlying causes for the decline in nutritional status immediately after birth. This view is informed by the observation that young children's caloric needs are much lower than those of adults ranging from 820 calories for children below the age of 1 to 1,550 for children aged 3-5, whereas adult men involved in moderate to heavy activity would need between 2,450 and 3,550 calories, depending on their age and the kind of activity (Smith, Alderman and Aduayon 2006). Other evidence in support of the view that caloric intake is only one of the many causes of malnutrition for children is that about 10% of wasted and stunted children have overweight mothers. Similarly, the fact that underweight children are found in households of all wealth groups suggests that there is more to child malnutrition than food energy availability alone.

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9 Of course in times of critical food shortages, children suffer as others but as a matter of course, it is not acute food shortages which determine under-nutrition in young children as evidenced by the low percentage of children that are wasted (3%).

10 The latter is confirmed by the geographic pattern of under-nutrition which shows that areas characterized by cereal surpluses, typically the south and west of the country, are also areas with relatively high rates of under-nutrition (Leach 2007).
Box 3.1: Eleven reasons why child malnutrition persists in food-secure households

1. Pregnant and nursing women eat too few calories and too little protein, have untreated infections such as sexually transmitted diseases that lead to low birth weight, work too hard and do not get enough rest.
2. Mothers have too little time to take care of their young children or themselves during pregnancy and after birth.
3. Mothers of newborns discard colostrum, the first milk, which strengthens the child's immune system.
4. Mothers feed children under 6 months foods other than breast milk even though exclusive breastfeeding is the best source of nutrients and the best protection against many infectious and chronic diseases.
5. Caregivers introduce complementary solid foods too late.
6. Caregivers do not recognize that their children are undernourished as their stature is comparable to that of so many other children of the same age.
7. Caregivers feed children under two too little food or with too low a frequency. Especially in households where only one meal a day is cooked, snack foods provides additional nutritional intake.
8. Caregivers provide food that is not energy dense. Though food is available and stomachs filled, young children's caloric needs are not met.
9. Caregivers provide an undiversified diet low in animal products and high in plant sources which provides too little in terms of key vitamin and minerals and protein.
10. Caregivers do not know how to feed children during and following diarrhea thereby worsening its consequences for the body. About a quarter of all caretakers reduce, rather than increase, fluid intake of children during an episode of diarrhea.
11. Poor hygiene and inadequate access to safe water contaminates food with bacteria or parasites.

Source: Adapted from Repositioning Nutrition, World Bank 2006

61. Food energy availability is, however, an issue for many and 44% of all Tanzanians are energy deficient. Information about calorie intake can be obtained from the HBS (2000/01). This survey comprises detailed consumption information on 129 food items collected using a diary method for a set of approximately 22,000 households over the period of one month. Using this data Smith, Alderman and Aduayon (2006) estimate that the per capita food energy availability is 2,454 calories, with people in rural areas consuming slightly more calories (2,487) than those in urban areas (2,314). The latter is probably a reflection of the higher energy needs in rural areas due to the higher physical intensity of labor. Calorie intake differs by wealth quintile with people in the poorest quintile consuming fewest calories (2,246) and those in the top quintile most (3,015).
62. Using the per capita energy availability it is possible to determine the fraction of people that is energy deficient, by comparing the per capita calorie availability with international reference data. If the cut off point for energy deficiency is put conservatively at the number of calories required for light activity 43.9% of Tanzanians is energy deficient. Amongst the poorest households almost 50% of people are energy deficient; amongst the wealthiest households some 36% are energy deficient. The difficulty households have in meeting their core energy needs is also reflected in the high percentage of consumption that is spent on food: 65%.

<table>
<thead>
<tr>
<th>Table 3.1: Food energy availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy availability per capita</td>
</tr>
<tr>
<td>Tanzania</td>
</tr>
<tr>
<td>Rural</td>
</tr>
<tr>
<td>Urban</td>
</tr>
<tr>
<td>First quintile</td>
</tr>
<tr>
<td>Second quintile</td>
</tr>
<tr>
<td>Third quintile</td>
</tr>
<tr>
<td>Fourth quintile</td>
</tr>
<tr>
<td>Fifth quintile</td>
</tr>
</tbody>
</table>

Source: Smith, Alderman and Aduayom (2006) based on HBS 2000/01

63. Not only are Tanzanian food energy deficient, diets are undiversified (71% of all energy is obtained from staples – Table 3.1), low in animal products and high in plant sources that act as anti-nutrients contributing to an inadequate intake of vitamin A, iron, zinc and leading to vitamin B1 and B2 deficiencies. To investigate the impact of enriching the diet with animal products, Lindeboom and Kilama (2004) combined data from various DHSes and the HBS 2000/01. They found a high correlation between the frequent consumption of meat and milk or milk products and a favorable under-five nutritional status. A comparable correlation is found using exclusively DHS data. Figure 3.1 illustrates how the prevalence of stunting amongst children that drank milk during the past 24 hours is much lower than that for those who did not drink milk.

64. The correlation as depicted in the graph may reflect the impact of milk consumption, but milk consumption could equally well be associated with other factors that positively affect nutrition such as income, or healthy living conditions. Unambiguous evidence towards the positive impact from milk consumption comes from Kagera. By including (imputed) expenses for milk consumption to the regression reported by Alderman, Hoogeveen and Rossi (2006a) one is able to control for potentially confounding factors. The results show a

---

11 Abdulai and Aubert (2004) confirm the above results. These authors investigate the degree to which increased income and reduced food prices would increase calorie intake using a panel data set from Dar es Salaam and Mbeya. They report an average per capita daily calorie intake of 2,270.
significant relation between milk consumption and anthropometric outcomes (height z-score as well as BMI).

Figure 3.1: Non parametric estimate of stunting and milk consumption

Source: Author's calculations using DHS 2004

Box 3.2: The milk hypothesis

The milk hypothesis was first put forward by Bogin (1998). It states that greater consumption of milk during infancy and childhood contributes to taller stature as an adult. The hypothesis suggests that it is not the energy supplied by milk that causes increased growth in height, but a type 2 nutrient or combination of nutrients in milk. It is currently speculated that bioactive peptides, milk IGF-I (insulin-like growth factors), amino acids or milk minerals are involved.

Among populations consuming nutrient-deficient diets, animal protein foods supply important nutrients such as high quality protein, calcium, zinc and other milk minerals which are important for linear growth (Hoppe, Molgaard and Michaelsen 2006). In populations with marginal or poor nutritional status, increased intake of animal foods has been shown to stimulate weight gain and linear growth in infancy, childhood and adolescence.

Ruel and Menon (2002) and Allen et al. (1992) analyzed the association between height and the intake of milk, meat, eggs, fish and poultry products or maize tortillas in 8 countries in central and south America. They found that milk intake was significantly associated with higher height for age z-scores.
65. These findings demonstrate that improving calorie intake and increasing dietary diversity are important elements of a nutrition strategy. It suggests that substantial benefits are to be gained from raising agricultural productivity as it contributes to reduced food prices (for urban households) and increased income for farmers. Inadequate diets also need to be addressed. Providing information about what constitutes a balanced diet, how to best prepare food, promoting livestock keeping and home gardening are ways to do so. Social marketing strategies, such as putting nutrition information on the back cover of student’s notebook, on the back of vaccination cards, or even on matchboxes are ways to bring such information to the attention of many.

3.2 Caring practices for young children and (pregnant) women

66. Food availability and diet are one aspect of nutrition. Caring practices determine whether the available food reaches the child and whether it reaches the child in the right form and frequency. Caring practices start during pregnancy. Pregnancy (and later lactation) substantially increases nutritional needs and inadequate feeding or rest place pregnant women and their babies at great nutritional risk. To reduce these risks pregnant women need access to appropriate health care, need to be informed about nutrition and have to eat appropriate foods during pregnancy and lactation.

67. Very young children are most susceptible to infections. To strengthen their immune systems and to avoid opportunistic infections, exclusive breastfeeding is recommended for the first six months of life. This recommendation is not widely followed (Table 3.2). In fact after a baby has reached two months of age most babies are no longer exclusively breastfed and at 4 to 5 months only 13.5% of babies remain exclusively breastfed. The cost of such inadequate breast feeding is high. It is believed that 14% of all child deaths due to diarrhea and 5.5% of all child deaths due to acute respiratory infections can be attributed to sub-optimal breastfeeding practices. This amounts to over 20,000 infant deaths per annum (Profiles 2006).

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Not breast feeding</th>
<th>Exclusively breastfed</th>
<th>Plain water only</th>
<th>Water based liquids/juice</th>
<th>Other milk</th>
<th>Complementary foods</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2</td>
<td>2.4</td>
<td>70.0</td>
<td>18.4</td>
<td>0.5</td>
<td>1.5</td>
<td>7.2</td>
<td>100.0</td>
</tr>
<tr>
<td>2-3</td>
<td>0.3</td>
<td>42.4</td>
<td>19.9</td>
<td>2.2</td>
<td>3.1</td>
<td>32.1</td>
<td>100.0</td>
</tr>
<tr>
<td>4-5</td>
<td>3.8</td>
<td>13.5</td>
<td>16.4</td>
<td>3.0</td>
<td>5.4</td>
<td>57.9</td>
<td>100.0</td>
</tr>
<tr>
<td>6-7</td>
<td>2.0</td>
<td>1.7</td>
<td>4.6</td>
<td>2.4</td>
<td>0.8</td>
<td>88.5</td>
<td>100.0</td>
</tr>
</tbody>
</table>


12 Abdulai and Aubert (2004) estimate that the income elasticity of calorie intake is at least 0.4 (suggesting that calorie intake would increase by 4% if incomes would raise by 10%) and a price elasticity of calorie intake of -0.1 (suggesting that a 10% decline in food prices would lead to an increase of calories intake by 1%)
68. As discussed in section 3.1 for children under the age of two years, the absolute amount of food in the household is unlikely to be the critical determinant for their food intake. It is rather the number of times each day they are able to eat and the energy and nutrient density of their diets. Evidence that directly measures the adequacy of care is not available, but the regression of section 3.4 provides circumstantial evidence. It shows for instance how, controlling for wealth, the prevalence of stunting amongst children declines with the number of meals. Household size also has a positive impact on nutritional outcomes, possibly indicating that larger families have more time available to devote to caring for young children.

69. Other evidence supporting the importance of caring practices comes from a comparison of nutritional outcomes between own and other children (grand children and other relatives) living in the same household. Own children do better (Figure 3.2). One explanation for this is that own children receive preferential treatment. A competing explanation is that children who left their original household were already malnourished when they arrived in their new household. The latter explanation does not hold for twins who are also more likely to be malnourished (Figure 3.2). Starting at birth twins are more likely to be and remain undernourished. The former is a reflection of competition for nutrients in the womb and between 0 and 20 months of age the gap between twins and other children grows gradually smaller. Yet the gap does not disappear completely supporting the notion that twins compete for care and end up short changed. (An alternative explanation would be that catch-up is not complete).

70. Lack of care may have many causes. Caregivers may simply not have the time to devote to their children or not recognize that there is a problem. In an environment where up to 50% of children are undernourished, parents may find it difficult to recognize that their child is not doing well. Parents may also be ill-informed as is suggested by the low adherence to exclusive breastfeeding during the first six months of life.

Figure 3.2: Non Parametric Estimate of Determinants of Stunting

![Figure 3.2: Non Parametric Estimate of Determinants of Stunting](image)

Source: Author's calculations using DHS 2004.
71. Improved information and understanding can do much to help change ill-informed behavior. The relation between maternal education and child nutrition is well-documented and is confirmed in the regression presented in section 3.4. Another indication that improved information matters can be distilled from Figure 3.3 which presents for rural and urban areas the fraction of stunted children for mothers who do and do not listen to the radio. In rural areas there is a strong association between access to information and lower levels of stunting, a relation that continues to hold in the multivariate regression presented in section 3.4. In urban areas no such association is found, possibly because information can be obtained from many different sources, making listening to the radio less of a distinct factor. Note, however, that listening to a radio does not have to imply better access to information. It could also indicate less work pressure (and more time for caring) or greater gender equality.

72. Apart from communication through the mass media, there exist many ways to provide information about healthy nutrition. Mothers of young children, for instance, can be reached during antenatal visits – 88% of pregnant women visit a health facility for at least one antenatal check-up and almost all of them for two or more – or at the time of the first visit to the health facility after the birth of the baby – 91% of babies are immunized with BCG. Community health days offer other possibilities for communicating sound nutrition practices. Throughout Tanzania, they are organized at least twice a year when children are provided vitamin A supplementation. Nutrition activities can also be organized around the Day of the African Child on June 16, and World AIDS Day in December. Schools are other venues for communication, both for siblings of young children who can share the information with their families, and for older pupils, especially adolescent girls, to gain greater understanding of nutrition.

Figure 3.3: Non parametric estimates of determinant of stunning and months

Source: Author’s calculations using DHS 2004.
3.3 Healthy living conditions improve nutrition

73. Living conditions matter greatly for nutrition outcomes. Children of normal birth weight can become malnourished in infancy—even if their nutritional intake is adequate, if they suffer from poor food absorption caused by diarrhea, malaria, pneumonia, helminthic or other diseases. And as disease leads to loss of appetite, decreased food intake and declines in the body's nutrient absorption capacity, at a time of increased nutrient requirements, the consequences for nutritional status of living in unhealthy conditions are considerable.

74. Living conditions for many households are not healthy. 53% of all households do not own at least one mosquito net, and only about one in four households owns an insecticide treated net. About half the population does not sleep under a mosquito net and only one in three households has access to piped water. About a third of the population relies on protected and unprotection wells for water and one in four households obtains its drinking water from springs, ponds, dams or rivers. About 80% of household in Tanzania uses a traditional pit toilet, regardless of the location of their residence. Modern toilet facilities are not common, even in urban areas (around 20% in 2004). Sixteen percent of households in rural areas and 32% of households in Zanzibar do not have any sanitation facilities. Improving living conditions is an important element of a nutrition strategy as unhealthy living conditions transpire in a high prevalence of childhood illnesses, such as malaria, diarrhea and acute respiratory infection (ARI). The prevalence of both diarrhea and acute respiratory infection—estimated by cough with fast breathing—is around 8% and 12% respectively. The proportion of children under five with fever, a symptom that is often associated with malaria is much higher, 24%. 14% of children took antimalarial drugs in the preceding two weeks. Notably, children up to the age of 2, the time during which the likelihood of under-nutrition rises dramatically, are 50% to 100% more likely to be affected by these childhood illnesses.

Table 3.3: Prevalence of infectious diseases during the past 2 weeks amongst children under five

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Symptoms of acute respiratory infection</th>
<th>Diarrhea</th>
<th>Fever</th>
<th>Took antimalarial drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;6 months</td>
<td>6.1</td>
<td>7.4</td>
<td>16.8</td>
<td>6.9</td>
</tr>
<tr>
<td>6-11 months</td>
<td>13.1</td>
<td>25.4</td>
<td>36.2</td>
<td>23.0</td>
</tr>
<tr>
<td>12-23 months</td>
<td>10.5</td>
<td>22.3</td>
<td>34.2</td>
<td>20.4</td>
</tr>
<tr>
<td>24-35 months</td>
<td>7.7</td>
<td>10.4</td>
<td>25.2</td>
<td>14.8</td>
</tr>
<tr>
<td>36-47 months</td>
<td>7.0</td>
<td>6.9</td>
<td>19.2</td>
<td>10.2</td>
</tr>
<tr>
<td>48-59 months</td>
<td>5.0</td>
<td>4.8</td>
<td>14.8</td>
<td>9.4</td>
</tr>
<tr>
<td>All children under 5</td>
<td>8.1</td>
<td>12.6</td>
<td>24.4</td>
<td>14.2</td>
</tr>
</tbody>
</table>

*Source: DHS 2005.*
75. The high incidence of infectious disease and the bidirectional interaction between under-nutrition and infection makes it necessary to break the vicious cycle. A healthy living environment with access to clean water, appropriate sanitation practices and malaria prevention allows doing so. The impact these environmental factors have on nutritional status is illustrated in Figure 3.4. Sleeping under a bed net, the absence of diarrhea, access to safe water or the presence of an improved toilet each contribute to improved nutrition outcomes.

**Figure 3.4: Non Parametric Estimate of determinants of stunting and age in months**

<table>
<thead>
<tr>
<th>Sleeps under bed net</th>
<th>Had diarrhea in past 2 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Graph" /></td>
<td><img src="image2" alt="Graph" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access to safe water, rural areas</th>
<th>Type of toilet, urban areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Graph" /></td>
<td><img src="image4" alt="Graph" /></td>
</tr>
</tbody>
</table>

**Source:** Author's calculations using DHS 2004

76. In conclusion: the unhealthy conditions in which many Tanzanians live result in diseases which, in turn, negatively affect nutrition outcomes. Improving living conditions is therefore an important element of a nutrition strategy.
3.4 Key factors contributing to under-nutrition

77. In this section we bring together the various explanatory variables for under-nutrition, household wealth, food intake, caring practices, environmental quality and low birth weight into one regression. Using the 2004 DHS data, we explain in a probit regression whether children aged 0-5 years are stunted.

78. Apportioning the various variables to different categories is inevitably arbitrary. For instance, having an overweight mother or weighting less than 3000 grams at birth were included as indicator of access to food, but could equally well have been put under caring practices. The regression performs reasonably well. The results are stable and comparable across specifications. The (pseudo) R-squared is acceptable (0.10 in rural areas; 0.12 in urban areas).

79. The regression, reported in Table 3.4 confirms the key finding reported earlier. They are summarized below:

- Household wealth is correlated with under-nutrition. In urban areas the relation is significant for all quintiles and the coefficients are decreasing in wealth i.e. greater wealth leads to better nutritional outcomes. In rural areas a significant relationship is only found for households of the fifth wealth quintile.

- The quality of living conditions matters. Children that sleep under a mosquito net or that live in a household with access to clean water are less likely to be stunted. The reverse holds for children that were sick recently either because they had diarrhea or because they had an acute respiratory infection.

- Caring practices matter. Controlling for low birth weight, twins do less well than other children, possibly because they compete for attention. Likewise, children living in families where mothers listen to the radio regularly do better, because of the information received, but possibly also because being able to listen to the radio reflects availability of time (for caring), or a greater interest in information. Mother’s education affects nutritional status as well.

- Food availability matters. Children living in households that eat meals more frequently, or where the mother is overweight are less likely to be stunted. Note that these variables are not a reflection of household wealth, as controls for this variable are included in the regression. Also note that the number of meals might also be considered an indicator of “caring practices” rather than of the availability of food.

- Caring for pregnant women matters. Low birth weight children are much more likely to be stunted.

80. The findings make clear the multiple causes of under-nutrition. Addressing under-nutrition will therefore require interventions across a range of sectors: in agriculture to enhance farm productivity and to increase diet diversity, in health to improve care for pregnant women, to early identify the signs of under-nutrition and to increase the use of bed nets, in water to increase access to and use of safe drinking water and in sanitation to spread the use of hygienic practices. The results also point to the need to improve the provision of
information about adequate diet and caring patterns, through the education system, extension services, health and community services, or through the mass media.

3.5 Conclusion

81. The conceptual framework (UNICEF 1990) considers three underlying causes for malnutrition: food energy availability and dietary diversity, caring practices for children and (pregnant) women, and the quality of living conditions. The latter two (caring practices and the quality of living conditions) received most attention, yet the analysis in this chapter demonstrates that all three matter.

82. Dietary quantity and diversity help ensure that all important nutrients and vitamins are consumed. An adequate diet is intrinsically related to adequate care and behaviors related to food handling and preparation. This is especially evident for young children whose nutritional status is arguably more affected by caring practices (hygiene, frequency of feeding, energy density of food served) than the absolute amounts of food they eat as the quantities involved are relatively small. But for older children, adolescents and adults food intake does matter and about 44% of all Tanzanian population eats too few calories to even sustain light work.

83. Caring practices and living conditions matter equally well. This makes addressing malnutrition truly multi-sectoral. After all addressing hygiene, food preparation, diet diversity, sleeping under bed nets, access to clean water, immunization etc. do not belong exclusively—and in some cases not at all, to the domain of nutritionists. In some instances, such as access to clean water or the provision of bed nets to pregnant women and children under five, progress is almost assured as champions exist outside the nutrition sector. In other areas nutritionists will need to take the lead. Changing caring practices is such an area where it is important that change happens. Changing behaviors is difficult, but none the less possible. In neighboring Rwanda, for instance, (Annex C2) 71% of women exclusively breastfeeds for a period of at least 4-5 months. There is no reason why this could not be achieved in Tanzania, where the comparator number is 14%.

84. In the next chapter the focus shifts from understanding malnutrition to what can and needs to be done in practice. The chapter discusses the need for interventions and considers which interventions are most attractive from a cost/benefit perspective. The chapter identifies a nutrition agenda that is affordable given the existing resource constraints.
Table 3.4: Probit regression on stunting for children aged 0-60 months

<table>
<thead>
<tr>
<th>Characteristics of individual</th>
<th>Rural Coef. T-stat</th>
<th>Urban Coef. T-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in months</td>
<td>0.0242</td>
<td>0.0249</td>
</tr>
<tr>
<td>Age in months squared</td>
<td>-0.0003</td>
<td>-0.0003</td>
</tr>
<tr>
<td>D-male</td>
<td>0.0249</td>
<td>0.0800</td>
</tr>
<tr>
<td>Age of father</td>
<td>-0.0024</td>
<td>-0.0022</td>
</tr>
<tr>
<td>Age of mother</td>
<td>0.0014</td>
<td>0.0025</td>
</tr>
<tr>
<td>Years of education of father</td>
<td>0.0036</td>
<td>-0.0041</td>
</tr>
<tr>
<td>Year of education of mother</td>
<td>-0.0081</td>
<td>-0.0062</td>
</tr>
<tr>
<td>D-2nd wealth quintile</td>
<td>0.0087</td>
<td>-0.0808</td>
</tr>
<tr>
<td>D-3rd wealth quintile</td>
<td>-0.0128</td>
<td>-0.1279</td>
</tr>
<tr>
<td>D-4th wealth quintile</td>
<td>-0.0155</td>
<td>-0.1488</td>
</tr>
<tr>
<td>D-5th wealth quintile</td>
<td>-0.0900</td>
<td>-0.1764</td>
</tr>
<tr>
<td>Characteristics of household</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D-had diarrhea in past 2 weeks</td>
<td>0.0758</td>
<td>-0.0306</td>
</tr>
<tr>
<td>D-had fever in past 2 weeks</td>
<td>0.0317</td>
<td>0.0386</td>
</tr>
<tr>
<td>D-had ARI in past 2 weeks</td>
<td>-0.0024</td>
<td>-0.1303</td>
</tr>
<tr>
<td>D-sleeps under bed net</td>
<td>-0.0908</td>
<td>-0.1190</td>
</tr>
<tr>
<td>D-has flush toilet or ventilated pit latrine</td>
<td>-0.1536</td>
<td>-0.368</td>
</tr>
<tr>
<td>D-has pit latrine</td>
<td>0.0203</td>
<td>-0.0170</td>
</tr>
<tr>
<td>D-use safe drinking water</td>
<td>-0.0337</td>
<td>0.0182</td>
</tr>
<tr>
<td>Distance to market</td>
<td>0.0008</td>
<td>-0.0010</td>
</tr>
<tr>
<td>Environmental characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D-twin</td>
<td>0.1515</td>
<td>-0.0016</td>
</tr>
<tr>
<td>Household size</td>
<td>-0.0053</td>
<td>-0.0132</td>
</tr>
<tr>
<td>Dependency ratio</td>
<td>-0.0064</td>
<td>0.0273</td>
</tr>
<tr>
<td>D-listens to radio regularly</td>
<td>-0.0368</td>
<td>0.0524</td>
</tr>
<tr>
<td>Food security</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of daily meals</td>
<td>-0.0440</td>
<td>0.0027</td>
</tr>
<tr>
<td>Mother is overweight</td>
<td>-0.0934</td>
<td>-0.0198</td>
</tr>
<tr>
<td>Caring for pregnant women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D-child was less 3000 grams at birth</td>
<td>0.1372</td>
<td>0.0863</td>
</tr>
</tbody>
</table>

Observations: 4806, 898
Pseudo R-squared: 9.5, 12.3

Note: ***, ** and * signals significance at respectively 99%, 95% and 90% levels of confidence.

Source: Author’s calculations using DHS 2004.
4. ADVANCING NUTRITION

85. Addressing malnutrition, it was argued in chapter 1 brings considerable economic and social benefits as it reduces mortality, leads to resources savings in health, improved education outcomes and increases incomes. Evidence of the reverse was also found. Higher incomes allow households to obtain diversified and adequate diets, to create healthy living conditions and to spend more time on child care. Higher income thus contributes to improved nutrition outcomes.

86. Tanzania is going through a period of high GDP growth of approximately 6% per annum. This chapter investigates whether this income growth is sufficient to achieve the MKUKUTA and MDG objectives for nutrition. The answer is a resounding, no, and the chapter continues to explore what interventions should complement income growth. It does so by exploring which interventions yield the highest benefits for every Shilling spent. Based on this analysis and starting from the premise that in the short term the existing budget constraint is unlikely to be changed, a nutrition agenda is formulated.

4.1 Income growth alone cannot achieve the MKUKUTA or MDG targets

87. If higher income is good for nutrition, does it imply that the MKUKUTA or MDG nutrition targets can be achieved with income growth alone? To investigate this two simulations are presented: (i) a MKUKUTA scenario aiming to reduce the level of stunting to 20% by 2010 and (ii) a MDG scenario aiming to reduce the prevalence of underweight to 15% by 2015. In both instances projected per capita income growth is 2.9%, which is the average rate of income growth attained between 1999 and 2004 (Economic Survey 2006). The underweight elasticity of real per capita income in the MKUKUTA scenario is set at -0.50 in the optimistic scenario, and -0.25, in the conservative scenario. In the MDG scenario, the stunting elasticity is set at -0.30 in the conservative and -0.60 in the optimistic scenario. The elasticities for the conservative scenarios correspond to those that can be derived from Alderman, Hoogeveen and Rossi (2006a) and are in line with those reported by Mkenda (2005). Elasticities in the optimistic scenarios are twice those of the conservative scenario.

88. Figure 4.1 presents the results of the scenario runs. It is evident that the MKUKUTA target of halving the prevalence of stunting by 2010 will not be achieved if one relies on income growth alone. Even using an optimistic elasticity and despite the inclusion of the observed drop in stunting from 44% in 1999 to 38% in 2004 the prevalence of stunting would only have dropped to 35% by 2010, far from the MKUKUTA target. And despite an even larger drop in underweight levels between 1999 and 2004 (from 29% to 22%) and despite the fact that the MDG only has to be achieved 5 years after the MKUKUTA target, income growth alone will be insufficient to achieve the hunger MDG and to reduce underweight to 15% by 2015.

13 Mkenda basis his estimate upon a review of a cross country study carried out by Haddad et al. (2003) studies on the elasticities of demand for calories in Tanzania by Abdulai and Aubert (2004a and 2004b).
89. It is worthwhile to explore what could explain the observed drop in malnutrition rates between 1999 and 2004 and how much income growth has contributed to it. The observed decline could be the result of much higher income – nutrition elasticities than the ones used in the simulations, but this seems unrealistic. In chapters 1 and 3 it was already observed that there is only a weak relation between household income and under-nutrition. And to assign the observed decline in nutrition to income growth alone, an elasticity in the order of magnitude of 2.1 would be required. It is more plausible that the decline is the result of a combination of income growth and non-income factors such as a more effective management of malaria, improved breast feeding and sanitation and increased access to iodized salt and vitamin A supplements.

90. Using the same assumptions as before – an average per capita GDP growth rate of 2.9% and an income – nutrition elasticity of 0.60, it is possible to demonstrate that about one third of the decline in the prevalence of malnutrition (stunting and underweight) between 1999 and 2004 can be attributed to income growth. Two third of the decline need to be explained by other factors. Likely candidates are mosquito nets, whose use increased from 21% to 36% between 1999 and 2004, the fraction of children that are exclusively breastfed which increased from 58% to 70% and the fraction of women that regularly listens to the radio which doubled from 31% to 61%.14

14 Other aspects that improved substantially between 1999 and 2004 are vitamin A supplementation and iodized salt. Unfortunately household level information for 1999 on these two aspects is not available.
Box 4.1: Income growth is not sufficient to achieve the nutrition MDG

A study carried out using data from the Kagera region concludes that income growth in combination with nutrition interventions is needed to attain the Millennium Development Goals. In this study the impact of income and of the presence of community based nutrition interventions are measured. It is found that both significantly improve nutritional status of children (stunting and underweight).

Projections using the coefficients obtained from the regression analysis show that the nutrition MDG can’t be achieved even under an optimistic income growth scenario. Only when nutrition interventions are available widespread will it be possible to achieve the nutrition MDG.

The table below reflects the main results of the study. Dark shaded cells reflect that the MDG objective is attained (i.e. at least a 50% reduction)

<table>
<thead>
<tr>
<th>Per capita income growth</th>
<th>Reduction in under-nutrition in Kagera (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reduction in under-nutrition (%)</td>
</tr>
<tr>
<td></td>
<td>No additional interventions</td>
</tr>
<tr>
<td>Underweight</td>
<td></td>
</tr>
<tr>
<td>1.3%</td>
<td>6.8</td>
</tr>
<tr>
<td>3.1%</td>
<td>13.3</td>
</tr>
<tr>
<td>5.0%</td>
<td>19.5</td>
</tr>
<tr>
<td>Stunted</td>
<td></td>
</tr>
<tr>
<td>1.3%</td>
<td>5.3</td>
</tr>
<tr>
<td>3.1%</td>
<td>8.7</td>
</tr>
<tr>
<td>5.0%</td>
<td>13.9</td>
</tr>
</tbody>
</table>

Source: Alderman, Hoogeveen and Rossi (2006a)

One way to explore whether increases in these endowments explains the drop in malnutrition is through a Blinder-Oaxaca decomposition. It is a way to explain the difference in malnutrition rates between 1999 and 2004 by decomposing it in an explained portion due to differences in endowments (more bed nets or good toilets) and an unexplained portion due to differences in the size of the coefficients (i.e. the ‘technology’ changes, for instance because of a more effective treatment of malaria). Doing this decomposition using a regression comparable to that reported in Table 3.4, but excluding the wealth quintile dummies, suggests that changes in coefficients were insignificant. Approximately half the change in under-nutrition can be explained by changes in endowments in particular bed nets, access to safe water, sanitation facilities and whether or not the household listens to the radio. Combining this result with the simulation’s finding that approximately 30% of the decline in malnutrition can be attributed to income growth, it seems likely that a combination of income growth and improvements in endowments were the driving force behind the decline in malnutrition.
Figure 4.2: Decomposition of the change in under-nutrition in Tanzania between 1999 and 2004

Source: Author’s calculations based on DHS

92. In conclusion, the nutrition MDG is attainable but only when income growth is accompanied by interventions that directly or indirectly improve nutrition outcomes. These may be community based nutrition interventions focusing on reducing low birth weight, improving child caring practices and exclusive breastfeeding, hygiene education or vegetable gardens but could equally well be improvements in access to safe water or the provision of bed nets.

4.2 The economic rate of return is high for many nutrition investments

93. There have been substantial efforts to establish rates of return for nutrition interventions (Horton 1999; Behrman, Alderman and Hoddinott 2004; Profiles 2006; Rossi 2006). Results are summarized in Table 4.1. It shows that at a 3-5% discount rate the benefits of reduced mortality, morbidity and increased productivity exceed the costs of implementing nutrition programs 1.4 to 176 times. In other words it is good economics to invest in nutrition interventions. Micro-nutrient interventions have the highest rate of return. Nutrition education programs focusing on macro-nutrient deficiencies have lower benefit-cost ratios but also in these cases do the estimated benefits exceed the costs.
Table 4.1: Estimates of benefit to cost ratios for nutrition interventions

<table>
<thead>
<tr>
<th>Intervention programs</th>
<th>Benefits/costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>International</td>
</tr>
<tr>
<td>Reducing macronutrient deficiencies</td>
<td></td>
</tr>
<tr>
<td>Breastfeeding promotion in hospitals</td>
<td>5 - 67</td>
</tr>
<tr>
<td>Integrated child care programs</td>
<td>9 - 16</td>
</tr>
<tr>
<td>Intensive pre-school program with considerable nutrition</td>
<td>1.4 - 2.9</td>
</tr>
<tr>
<td>for poor families</td>
<td></td>
</tr>
<tr>
<td>Reducing micro-nutrient deficiencies</td>
<td></td>
</tr>
<tr>
<td>Iodine supplementation (women)</td>
<td>15 - 520</td>
</tr>
<tr>
<td>Vitamin A supplementation (children&lt;6y)</td>
<td>4.3 - 43</td>
</tr>
<tr>
<td>Iron fortification (per capita)</td>
<td>176 - 200</td>
</tr>
<tr>
<td>Iron supplementation (per pregnant women)</td>
<td>6.1 - 14</td>
</tr>
</tbody>
</table>

Note: Figures are based on empirical studies of nutrition interventions and subject to a number of assumptions; calculations assume a 3-5% discount rate and include both private and social costs

Source: Behrman, Alderman and Hoddinott (2004); Profiles (2006) & Table 4.2

94. A potential obstacle to these economically attractive investments is that some returns are immediate (reduced mortality; reduced health care costs) while others only materialize in the medium term. A program reducing stunting during the first two years of life, will only achieve many of its economic benefits when beneficiaries enter the labor force. The benefit-cost analysis takes this into account by discounting the stream of future benefits at 3-5% per annum. A higher discount rate may be preferred to reflect the resource constraint (and high opportunity costs) the Government of Tanzania faces. As a rule of thumb—and assuming that all benefits occur after 15 years and last for 40 years, the benefit-cost ratios of Table 4.1 would have to be reduced by a factor 3 to 4. Even at such high discount rates, most nutrition interventions remain economically attractive, further strengthening the case for investments in nutrition.

95. For historical and other reasons there is considerable interest in community based approaches in Tanzania, in part because of the Iringa program whose triple A approach (Assessment-Analysis-Action) has inspired community based efforts across the globe. For this reason we consider the costs and benefits of two Tanzanian community based approaches implemented in Iringa and Kagera. The Iringa program was run by UNICEF between 1983-1988. The program focused on nutrition rehabilitation and intervention in 168 villages with an emphasis on social mobilization and community animation (Dolan and Levinson 2000). The Iringa program reflected the view that nutritional status of an individual “is the outcome of a complicated process embedded in the fabric of society” (JNSP evaluation report, 1988). As part of the Iringa program 46,000 children under the age of 5 were measured and weighted annually.

96. The Kagera program was (and still is) implemented by Partage a private NGO dedicated to children’s welfare in rural areas. It focuses on social mobilization and reinforcing the ability of families and communities to care for their children. Partage specializes in orphans and aims at sharing with needy households the responsibility of educating and bringing up their children. Only children of families below the poverty line
who commit themselves to actively participate in the program are eligible. Partage was
created as a nutritional program but has started to cover areas like education as well.

97. Rossi (2006) assesses in detail the costs of both programs and estimates the cost per
beneficiary per year between $54 (Iringa)\(^{15}\) and $60 (Partage). If the Iringa program were to
be scaled up to a nationwide program, the cost per beneficiary could drop to $14, but only
under an optimistic scenario where no additional structures have to be built, start-up costs are
zero and there are substantial economies of scale reducing the operating cost to 70%. The
cost would be $60 under a scenario where there is no scope for economies of scale and
investments in physical infrastructure have to be made. Which scenario is most realistic
depends much on how a program was to be implemented. If the intervention is a stand-alone
operation then the higher cost estimate would be realistic. If, on the other hand, the
intervention was integrated in an ongoing program and only marginal costs would have to be
paid, the lower cost estimate may be more realistic.

98. On the benefit side three kinds of benefits are distinguished: height, which may be
considered a proxy for health, educational attainment (in years) and (avoided) delays in
school enrollment. Analysis using the KHDS data by Alderman, Hoogeveen and Rossi
(2006b) suggest that the net present value of the total benefit is $521 (at a 5% discount rate)
and $144 at a 10% discount rate. Approximately 25% of this benefit is attributable to
additional schooling and reduction in delayed enrolment while the remainder is due to
increased height. These estimates are a lower bound of the total benefits as they do not
capture reduced mortality or lower health care costs. On the other hand, the coefficient for
height in the earnings regression is amongst the highest found in the literature and may well
be overestimated.\(^ {16}\)

<table>
<thead>
<tr>
<th>Discount rate</th>
<th>Net present value of $14 for 2 years</th>
<th>Net present value of $60 for 2 years</th>
<th>Benefit/Cost ratio at an intervention cost of $14 beneficiary for two years</th>
<th>Benefit/Cost ratio at an intervention cost of $60 for two years</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>521</td>
<td>27.3</td>
<td>117.1</td>
<td>19.1</td>
</tr>
<tr>
<td>10%</td>
<td>144</td>
<td>26.7</td>
<td>114.5</td>
<td>5.4</td>
</tr>
</tbody>
</table>

Source: Based on Rossi 2006 and Alderman, Hoogeveen and Rossi, 2006a.

99. To derive the benefit-cost ratio for community based interventions Table 4.2
demonstrates the results for two different scenarios at a cost of $14 and $60 per annum and
at discount rates of respectively 5% and 10%. It is furthermore assumed that to achieve
results an intervention would have to deal with a child for a period of two years. The table
demonstrates that community interventions are economically feasible. The cost/benefit ratios
are all greater than one, and within the range of ratios presented in Table 4.1. The ratio’s are,
however, substantially lower than those for micro-nutrient interventions.

\(^{15}\) Or $41 in 1987 prices.

\(^{16}\) In the earnings regression, height was not instrumented. Studies that do instrument show, however, that
the height coefficient in such regressions is likely to be biased upwards.
100. In conclusion, many nutrition interventions are economically attractive but ranked by their benefit-cost ratios, there is a clear hierarchy. Most attractive are micro-nutrient interventions, followed by interventions aiming at pregnant women and promoting exclusive breast feeding. Community based interventions are also economically attractive in that their benefit-cost ratios exceed one –even at high discount rates, but its benefit-cost ratios are substantially lower than those for micronutrient interventions or interventions aimed at pregnant or lactating mothers.

**Box 4.2: School feeding is an intervention that improves education, not nutrition.**

Certain interventions have not been considered in this section, not because their benefit-cost ratios are not attractive but because their impact on nutrition outcomes is limited. School feeding is an example of these.

School feeding programs have limited to no impact on nutrition outcomes. This is unsurprising as most under-nutrition is not fully reversible and occurs during pregnancy and the first two years of life. Interventions targeting children over two years of age are less likely to have an impact. Another reason for the limited impact of school feeding on nutrition is that parents of children who receive a school meal are likely to consider the school meal a replacement for a meal provided from home. Consequently, children will be sent to school without a provision for lunch (where they previously carried a lunch box) or receive less food at home.

School feeding programs are still worth considering. School feeding can be very effective in motivating children to attend school and improves classroom behavior, by alleviating short term hunger, thus eventually improving school performance. Evidence shows that school feeding or take home rations improve school enrollment and attendance especially for girls. School feeding programs therefore may be considered as part of the education program and their effectiveness should be assessed in relation to other education interventions.


### 4.3 The budget for nutrition interventions is limited

101. The previous section demonstrated the economic rationale for nutrition interventions. Benefits exceed costs to a large degree, even at high discount rates, implying a more than fair return to nutrition investments. This is sufficient basis to argue for investments in nutrition. Next we consider what investments might be feasible given budget existing constraints.

102. A first step to this end is to consider the cost of interventions. Here the full costs of interventions are taken (as if interventions were stand-alone exercise), but note that for many there is scope to integrate them in ongoing activities in which case the unit cost would be less as only the additional costs would have to be covered. International cost estimates vary from as low as $0.02 per beneficiary per year in the case of salt fortification with iodine to as much as $2-10 per beneficiary per year for community based growth promotion (Caulfield et al. 2005, Horton 1999). Estimates carried out for Tanzania suggest that the cost of implementing nutrition interventions in Tanzania are somewhat higher but otherwise
comparable to those done elsewhere: approximately $0.03 per capita for salt iodization, $0.71 for vitamin A supplementation, $3.4 per for iron supplementation per pregnancy and up to $14 - $60 for intensive targeted growth promotion per infant (MOST 2005; Profiles 2006; Rossi 2006).

Table 4.3: Annual Cost of Nutrition Interventions ($ / capita)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Delivery Method</th>
<th>Tanzania</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fortification</td>
<td>Supple-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>mentation</td>
</tr>
<tr>
<td>Iodine</td>
<td>0.02-0.05</td>
<td>0.8-2.75*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A</td>
<td>0.17</td>
<td>0.9-1.25</td>
</tr>
<tr>
<td>Iron</td>
<td>0.09-1.00</td>
<td>3.17-5.30</td>
</tr>
<tr>
<td></td>
<td>Less Intensive</td>
<td>More Intensive</td>
</tr>
<tr>
<td>Growth</td>
<td>2-5</td>
<td>5-10**</td>
</tr>
<tr>
<td>Promotion</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: * For iodized oil injections; ** For example, with paid workers/food supplements

Source: Caulfield et al. (2005); Tanzania Profiles Team (2006), MOST (2005).

Table 4.4 presents the potential number of beneficiaries based on population projections made out of the 2002 Population and Housing Census. It shows that there are approximately 6 million children under the age of 5 of which about half, 3 million are under the age of two. Taking the DHS estimates of incidence of stunting and underweight, it suggests that 2.3 million children are stunted and 1.3 million underweight. Micro-nutrient deficiencies affect equally large numbers of children. Approximately 2 million children are anemic, some 10% of all children is vitamin A deficient and about 1.6 million children below the age of 2 live in a household consuming inadequately iodized salt.

Table 4.4: Projected population for 2004

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11</td>
<td>1,501,614</td>
</tr>
<tr>
<td>12-23</td>
<td>1,407,109</td>
</tr>
<tr>
<td>24-35</td>
<td>1,360,282</td>
</tr>
<tr>
<td>36-47</td>
<td>950,233</td>
</tr>
<tr>
<td>48-59</td>
<td>824,010</td>
</tr>
</tbody>
</table>

| Total 0-23    | 2,908,723   |
| Total 0-59    | 6,043,248   |
| Total population | 35,731,938 |

Source: Author’s calculations based on population projections (URT/NBS 2006).
103. Table 4.5 provides an overview of the budget that is available for investments in nutrition from three key actors (and funders): TFNC, UNICEF and HKI. It makes a distinction between administrative expenses and investment expenses. The budget TFNC has available for investments fluctuated in the past years but went down to about $500,000 with the budget guidelines for the year 2007/8. But even if we were to take an optimistic approach, it is hard to see how the budget for investments in nutrition could exceed $5 million per annum.

104. The population projections in combination with the available budget is sobering. A nutrition program targeting the most vulnerable only, that is children under the age of two and pregnant women would still have to reach approximately 3 million children and 1.5 million pregnant women per annum. And at an investment budget of less than $3.3 million, there is barely enough to spend $0.75 person per year. It would permit only a focus on vitamin A, deworming and iodine fortifications.

Table 4.5: Budget for nutrition interventions

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Year</th>
<th>Currency</th>
<th>Administrative expenses</th>
<th>Investment Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFNC</td>
<td>2007/2008</td>
<td>USD</td>
<td>800,000</td>
<td>500,000</td>
</tr>
<tr>
<td>UNICEF</td>
<td>2007/2008</td>
<td>USD</td>
<td>Not Available</td>
<td>2,100,000</td>
</tr>
<tr>
<td>HKI</td>
<td>2005/2006</td>
<td>USD</td>
<td>330,000</td>
<td>670,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>USD</strong></td>
<td><strong>3,270,000</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: In 2005/06 TFNC's budget was considerably higher: $2.5 million, of which $800,000 was spent administratively.

105. Despite hard budget constraints, additional budget for nutrition exists. Four sources can be identified (i) larger aid from development partners (DPs); (ii) an increased budget allocation from Ministry of Health and Social Welfare (MoHSW); (iii) increased efficiency in delivering nutrition interventions and (iv) collaboration with other sectors and programs. These four sources and their potential are captured in Figure 4.3, presenting a budget diamond. In the short run the scope for increased budget is limited. At a total health budget of $12 per capita it will be hard to obtain more resources from Ministry of Health and Social Welfare. Also development partners may be unable to provide additional resources. And if they were to provide additional resources, it is likely to be channeled through budget support or the health basket. In the long run more resources for nutrition may become available, not from development partners directly but channeled through MoHSW. This is reflected in Figure 4.3 by the outward shift of the upper, right corner of the budget diamond between the short and the long run.
106. In the short run, the two areas with the greatest potential for additional budget are increasing the efficiency of nutrition interventions, through targeting or by no longer supporting ineffective interventions (see Box 4.2 or annex F for examples) and by tapping into resources available in other programs. The latter presents the greatest potential as there are numerous programs that could be tapped. TASAF for instance, the social fund, could include community based interventions in its list of eligible activities; TACAIDS could include the promotion of healthy diets in its information campaigns; Local Governments could be asked to include the cost of distributing vitamin A and deworming tablets in their budgets, while the cost of purchasing vitamin A and deworming tablets could be included in the budget for drugs in the Ministry of Health. The malaria voucher program could be approached to also include the distribution of iron pots (to prevent anemia) in its program, and should be convinced to include nutrition programs so as to enhance the effectiveness of their program (Ehrhardt et al. 2006). There are numerous other possibilities related to the Water Sector Development Program, the Water Supply and Sanitation Program, the Agricultural Sector Development Program (ASDP) or the sanitation and hygiene program. Table 4.6 identifies a number of policies and interventions that could be followed with possible beneficial impact on nutrition.
<table>
<thead>
<tr>
<th>Sector / program</th>
<th>Opportunity for nutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water Sector Development Program (WSDP)</strong></td>
<td>• Prioritize communities with high diarrhea prevalence or communities where it takes a long time to fetch water.</td>
</tr>
<tr>
<td>The Water Sector Development Program (WSDP) is the joint DP-Government approach to implement the Ministry of Water’s sector strategy. Under a SWAp, the program plans to spend $ 951 over a 5-year period starting in 2007. The objective is to improve access to safe water in order to achieve the targets defined in the MKUKUTA, the National Water Policy (NAWAPO) and the National Water Sector Development Strategy (NWSDS). The WSDP is in its start-up phase.</td>
<td>• Include nutrition concerns in the district water budget allocation formula.</td>
</tr>
<tr>
<td><strong>Ministry of Health and Social Welfare</strong></td>
<td>• Collaborate on social marketing with the sanitation of the Water Supply and Sanitation Project (WSSP) a $200 million sector investment loan supported by the World Bank that contributes to the WSDP.</td>
</tr>
<tr>
<td>The Ministry of Health and Social Welfare is the parent Ministry for TFNC and is responsible for many of the policies and strategies which directly affect nutrition outcomes. The Ministry chairs committees responsible for control of micronutrient deficiencies: the national Vitamin A Consultative Group; the National Anemia Consultative Group and the National Council for the Control of Iodine Deficiency Disorders. The Ministry is the parent organ for the Medical Stores Department through which drugs and medical supplies are provided – including those needed for control of micro nutrient deficiencies and the curative services of health facilities. Health services are determined by the National Package on Essential Health Interventions, which includes nutrition as one of its interventions. The delivery of services is health facility based and focuses on curative aspects. Facility-based health services are being strengthened, planning is made more systematic and service provision more focused on burden of disease. The example of the Tanzania Essential Health Interventions Project (TEHIP) is promising.</td>
<td>• Continue to support nutrition as an important disease prevention strategy.</td>
</tr>
<tr>
<td></td>
<td>• Develop a system of preventive outreach programs by non-medical staff to improve nutrition outcomes and to reduce the workload for medical staff.</td>
</tr>
<tr>
<td></td>
<td>• Identify nutrition milestones in the Annual Joint Health Sector Review</td>
</tr>
<tr>
<td></td>
<td>• Set clear targets for the delivery of vitamin A, salt iodization, anemia reduction and exclusive breastfeeding in the Health Sector Strategic Plan.</td>
</tr>
<tr>
<td></td>
<td>• Appoint a nutrition desk officer in the Ministry to provide in-house expertise and to strengthen coordination with TFNC.</td>
</tr>
<tr>
<td></td>
<td>• Include the purchase of vitamin A and deworming tables in the health budget.</td>
</tr>
<tr>
<td>Bed Net Voucher Scheme</td>
<td>Agricultural Sector Development Program (ASDP)</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------------------------------------</td>
</tr>
<tr>
<td>All pregnant women in Tanzania, upon their first pre-natal care visit, are entitled to receive a voucher that can be redeemed from a retailer for a bed net. The voucher is worth the equivalent of $2.50 redeemable for a bed net (which is sold for between $3 and $10, depending upon quality and size). The Tanzania National Voucher Scheme (TNVS) is a public-private partnership that supports local industry while tapping into the strengths of the private sector in order to achieve a public health objective.</td>
<td></td>
</tr>
<tr>
<td>- Mainstream disease targeted vitamin A supplementation.</td>
<td>- Explore whether provision of iron pots to pregnant women could be included in the program.</td>
</tr>
<tr>
<td>- Improve malnutrition rehabilitation.</td>
<td>- Explore possibilities to enhance the effectiveness of the malaria control program by including nutrition education element in the program.</td>
</tr>
</tbody>
</table>
ASDP has several components that could support nutrition outcomes. The greatest potential lies in the activities focusing on (i) increased and more stable household food production. (ii) Increase farm incomes and the ability of farm households to diversify and supplement their diets through purchased foodstuffs, (iii) Reduced labor demand, especially during peak periods and (iv) Increase consumer awareness of good nutrition practices and the benefits of a diversified diet.

<table>
<thead>
<tr>
<th>Ministry of Community Development, Gender and Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Ministry of Community Development, Gender and Children (MCDGC) was established in 1990 with the view of empowering people to recognize their own ability to understand themselves and their environment, change their attitudes positively, so that they can take a leading role geared at increased responsibility in improving and managing their living conditions effectively and efficiently.</td>
</tr>
<tr>
<td>As part of its mandate the Ministry coordinates the activities is over 4,000 NGOs. Their activities cut across different Social/Economic Sectors from National to the grassroots level.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ministry of Education and Vocational Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools do provide an opportunity for communication of information about sound nutrition practice which can serve well not only the children concerned but their households as well. Especially for older primary school aged girls, health programs in schools could provide an effective means of communicating important nutrition information. The Ministry of Education has a permanent committee that reviews the</td>
</tr>
</tbody>
</table>

| increase and stabilize yields, including activities to promote milk production, to develop vitamin A enriched sweet potatoes or quality protein maize. |
| - Promote research into time saving technologies for women such as a reduction of time gathering wood through less energy intensive food preparation methods and/or woodlot activities. |
| - Include importance of a diversified diet in training for extension officers and private service providers and use extension agents to spread information about good nutrition. |

<table>
<thead>
<tr>
<th>Emotional and Vocational Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Promote good nutrition as important early childhood development strategy.</td>
</tr>
<tr>
<td>- Review primary education curriculum and ensure that nutrition questions are included in the primary school leaver exam.</td>
</tr>
</tbody>
</table>
education curriculum. Assess the nutrition component in the existing curriculum and update it when necessary.

<table>
<thead>
<tr>
<th>Local Government Authorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanzania is committed to decentralization by devolution and has an administrative structure which provides for planning and management by local authorities in rural villages, urban mtaa and district and urban councils. Central budget is allocated to districts using formulae.</td>
</tr>
<tr>
<td>- Identify nutrition focal points in districts.</td>
</tr>
<tr>
<td>- Report (and be accountable for) progress made in achieving results in nutrition.</td>
</tr>
<tr>
<td>- Make nutrition more central in district development plans</td>
</tr>
<tr>
<td>- Include nutrition in budget allocation formula</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>NBS is preparing the Tanzania Statistical Master Plan. This plan aims to improve the quality of statistics in a user oriented manner.</td>
</tr>
<tr>
<td>As part of the activities in support of TSMP and funded by the Mkukuta Pooled Fund a review of the National Survey Calendar takes place between May and July 2007. This review provides an opportunity to monitor progress in nutrition outcomes in a coherent fashion, for instance by ensuring that anthropometric information is collected in the National Panel Survey, the Demographic and Health Survey, the Household Budget Survey and in the Surveillance Sites. This review also provides an opportunity to include more micro-nutrient related questions in the DHS and to seek to do impact evaluation through the National Panel Survey.</td>
</tr>
<tr>
<td>- Capture nutrition routinely in the household survey program.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TACAIDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Mission of the Tanzania Commission for AIDS is to provide strategic leadership and to coordinate the implementation of a national multi-sectoral response to HIV/AIDS leading to the reduction of further infections associated diseases and the adverse socio-economic effect of the epidemic.</td>
</tr>
<tr>
<td>- Promote adequate feeding for the entire population.</td>
</tr>
</tbody>
</table>
**Tanzania Social Action Fund (TASAF)**

TASAF is a $150 million program implemented by the Government of the United Republic of Tanzania. Its objective is to enhance the capacity of communities and other stakeholders (e.g. district and village government, NGOs etc.) to prioritize, implement and manage sustainable development initiatives, and in the process improve socio-economic services and opportunities that contribute to improved livelihoods linked to MDG indicators targets in the Mkukuta.

TASAF has developed so called service guidelines to illustrate the kind of activities that communities may wish to implement. These activities have to involve community participation and contribute to achieving the MDG or Mkukuta goals. At present the activities include elements like infrastructure construction (boreholes, classrooms), bed net promotion or training of traditional birth assistants or family planning promoters.

Community based nutrition activities or training are currently not included in the service guidelines. There is still scope to do so.

- Include community based nutrition activities in service guidelines
4.4 Defining the nutrition agenda

107. Based on the previous analyses it is possible to arrive at a program of nutrition interventions. The program comprises four elements.

108. The first element deals with addressing vitamin and mineral deficiencies and is recognition of the high rates of return micro-nutrient interventions yield. Tanzania has already made much progress in this area, in particular vitamin A supplementation, deworming and control of iodine deficiency and the agenda aims to expand the coverage of these interventions. The vitamin A program will have to ensure that all children under 5 receive twice yearly vitamin A supplements and that the majority of women receive the recommended single postpartum dose of vitamin A, for instance by delivering it to mothers at the time of the first BCG vaccination for their children (more than 90% of all children receive their BCG vaccination – DHS 2005). Also, children suffering from diseases that deplete the body's vitamin A status (diarrhea, measles, ARI, TB and severe clinical PEM) should receive supplemental vitamin A (disease targeted vitamin A supplementation). Likewise the iodine program will need to be intensified to ensure that adequately iodized salt becomes available where this is current not the case. 17

109. Other micro-nutrient interventions deserve serious consideration, especially anemia reduction. Addressing anemia is attractive if only because it has immediate benefits for labor productivity and maternal survival. Pilot projects in Iringa, Handeni and Korogwe are ongoing and aim to demonstrate the feasibility of fortification of maize flour at hammer mill level. Fortification of centrally processed foods such as is tested by a company based in Arusha which is fortifying cereal flour is another possibilities. Both need to be carefully assessed as to whether they target the right population and for their feasibility to be scaled up. Especially reaching a large number of many hammer mills may be logistically difficult. Other opportunities exist. Sugar and soft drinks, which are produced in only a limited number of factories places and which are widely consumed in urban and rural areas can serve as vehicle for iron fortification (Layrisse et al. 1976). The introduction of iron pots or improving their use for the preparation of food has been found to be a promising innovative intervention for reducing iron deficiency and iron deficiency anemia (Adish et al. 1999; Borigato and Martinez 1998; Geerligs, Brabin and Omari 2003). A pilot trial in Ethiopia found, for instance, that the provision of iron pots (costing about $3 per pot) was a less costly alternative than the provision of iron supplements (Ruel 2001). To date the use of iron pots has not caught on and it needs to be assessed why this is the case.

110. The second element focuses on prenatal care and feeding practices for young children, in recognition of the fact that many children are born with nutrition related deficiencies or become malnourished soon after birth and that recommendations on exclusive breastfeeding are largely not followed. Interventions seek to improve care for pregnant women (including the provision of micro-nutrients and deworming), the promotion of exclusively breastfeeding and adequate (complementary) feeding practices and care. Activities in this area will mostly have to be taken in collaboration with other sectors, the Ministry of Health and Social Welfare and TACAIDS in particular.

17 There are about 4500 small scale salt producers in Tanzania and they are largely responsible for the un-iodated salt in the market.
Box 4.3: Nutrition agenda

1. **Address vitamin and mineral deficiencies**
   - Maintain and expand vitamin A provision and deworming (6-59 months).
   - Maintain and expand iodine fortification.
   - Maintain and expand vitamin A supplementation to post-partum women.
   - Maintain and expand iron supplementation to pregnant women and pursue iron fortification for the population at large.

2. **Prenatal care and care and feeding practices for young children**
   - Maintain and expand deworming, malaria prophylaxis, iron and folic acid supplementation to pregnant women.
   - Promote exclusive breastfeeding for the first six months of life.
   - Provide insecticide treated bed nets and iron pots for all pregnant women and children under 5.
   - Enhance complementary feeding and food fortification.

3. **Improve the efficiency of delivery and financing mechanisms through:**
   - **i. Promotion of decentralized service delivery through districts**
     - Appoint nutrition focal points in every district and hold them accountable.
     - Include nutrition service delivery in district budgets.
   - **ii. Coordination with and outsourcing to other sectors and programs:**
     - **TACAIDS:** start an education and information campaign stressing the importance of a healthy diet.
     - **Ministry of Health and Social Welfare:** include the provision of minerals and vitamins in health budget
     - **Malaria Voucher Scheme:** add provision of iron pots to the bed net scheme.
     - **Ministry of Education and Vocational Training:** consider nutrition an essential early childhood education strategy.
     - **Ministry of Community Development, Gender and Children:** promote at community level care and appropriate feeding practices for young children.
     - **Private Sector and NGOs:** Establish Public-Private Partnerships for food fortification, social marketing and implementation of activities
   - **iii. Enable TFNC**
     - Strengthen TFNC, de-emphasize the focus on implementation but focus on strategic planning, coordination, monitoring and the preparation of guidelines; align staffing in accordance with these tasks.
     - Agree on time frame to complete the enabling of TFNC.
   - **iv. Improved accountability and harmonization**
     - Hold parent ministry (MoHSW), LGAs and TFNC responsible for results.
     - Create nutrition Sector Working Group.
     - Initiate annual Nutrition Sector Review.
   - **v. Improve the ability to monitor and evaluate.**
     - **National Bureau of Statistics:** include nutrition questions routinely in the household survey program.
     - **Ministry of Health and Social Welfare:** include nutrition indicators in HMIS

4. **Advocacy and preparations for additional nation wide interventions**
   - Improve profile of nutrition amongst policy makers.
   - Identify effective communication strategies aimed at behavioral change.
   - Identify a cost-effective, scalable package for community based nutrition services.
111. The third element comprises various activities that would lead to an enhanced efficiency of delivery mechanisms. It stresses the importance of decentralized delivery of nutrition services, a first step to which is the appointment of nutrition focal persons in each district. It also recognizes that improved food intake and a balanced diet, caring practices and healthy living conditions are also addressed by other sectors and programs. Better coordination with (and outsourcing to) these sectors will allow activities undertaken by these sectors to benefit nutrition as well. Greatest potential appears to exist in a better collaboration with Ministry of Health and Social Welfare, TACAIDS and the bed net voucher scheme, NBS, the Ministry of Agriculture, Food Security and Cooperatives and the Ministry of Community Development, Gender and Children. Other aspects will be discussed in greater detail in the next section. They revolve around the restructuring of TFNC, improved monitoring, accountability and harmonization.

112. The fourth and final element considers actions needed to build a constituency for large scale interventions in the future. It requires building a political constituency to get a budget that would permit additional nation wide interventions. Meanwhile (a package of) interventions has to be identified that is effective, affordable and scalable, including research into effective means to communicate the nutrition message. Information provision through the mass media and through health staff present opportunities. A systematic analysis of (i) how to best improve people’s knowledge on healthy nutrition, (ii) under which circumstances improved knowledge leads to behavioral change and (iii) the costs and benefits of various approaches would go a long way towards building a support base for larger nutrition interventions. Again, collaboration with other sectors and programs can help share costs, especially TACAIDS, WSSP and the Ministry of Education and Vocational Training.

113. Table 4.7, finally, presents a first attempt at costing the nutrition agenda as proposed above, identifying interventions that need to be paid for by the nutrition sector (TFNC, HKI, UNICEF) and those that can be relegated to others. It is clear from the table that even the very limited nutrition agenda as it is formulated her cannot be funded by the nutrition sector alone. Cost sharing and expanding the fiscal space for nutrition through collaboration, efficiency gains and tapping into additional resources are extremely important.

4.5 Conclusion

114. To achieve the MDG and MKUKUTA nutrition objectives high income growth will have to be combined with nutrition interventions. Interventions are not only desirable from an equity and social perspective, they are good economics. Even at a discount rate of 10% the benefit cost ratios of most nutrition interventions exceeds one. In other words, the rate of return to investments in nutrition is at least 10% per annum, and in most instances much more than that. Spending on nutrition is an investment at par or better than investments in malaria control, trade liberalization or community managed water supply, programs that each receive considerable funding (Lomborg 2004).

115. This chapter shows that supplementation or fortification with vitamins and minerals (iodine, vitamin A, iron) yields the highest rates of return. Interventions that focus on prenatal care, care and feeding practices for young children are also attractive though the rates of return are somewhat less. In formulating the nutrition agenda, these two interventions are given priority, whereby it is noted that an affordable and effective program of (community based) interventions aimed at behavioral change still needs to be identified.
116. The budget available for nutrition investments is limited. Even a minimum program focusing on essential vitamins and minerals and care for pregnant women and young babies cannot be afforded. But as nutrition is multi-sectoral there exist opportunities to leverage the budget through collaboration with other sectors and programs. Anemia could be reduced by combining the bed net voucher scheme with the provision of iron pots. The AIDS program is well placed to take forward the agenda on adequate and healthy diet as good nutrition is the first line drug against the onset of HIV/AIDS. Other opportunities exist with respect to Health and Social Welfare, Water and Sanitation, Agriculture, Community Development, Education and even Statistics.

117. Enhancing the efficiency of delivery and coordination mechanisms is another way to free resources for essential nutrition services. It is included prominently in the nutrition agenda also because it enhances the credibility of the nutrition sector when it argues for more resources. The next chapter discusses reforms needed to enhance the performance of the nutrition sector.
<table>
<thead>
<tr>
<th>Number of beneficiaries</th>
<th>Other actors</th>
<th>Percent paid by nutrition Sector</th>
<th>Investment cost borne by nutrition sector</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Address vitamin and mineral deficiencies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain and expand vitamin A provision and deworming</td>
<td>5,300.00 0</td>
<td>MoHSW, MoLG</td>
<td>20%</td>
<td>$752,600                      $ 0.71 / beneficiary</td>
</tr>
<tr>
<td>Maintain and expand iodine fortification</td>
<td>35,700.00 00</td>
<td>MoLG</td>
<td>80%</td>
<td>$1,142,400                     $ 0.04 / beneficiary</td>
</tr>
<tr>
<td>Maintain and expand iron and vitamin A sup. to post-partum women and working population</td>
<td>1,500.00 00</td>
<td>MoHSW</td>
<td>0%</td>
<td>$0</td>
</tr>
<tr>
<td>2. Prenatal care and care and feeding practices for young children</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain and expand deworming, malaria prophylaxis and iron and folic acid supplementation to pregnant women</td>
<td>1,500.00 0</td>
<td>MoHSW</td>
<td>0%</td>
<td>$0</td>
</tr>
<tr>
<td>Exclusive breastfeeding and breastfeeding promotion</td>
<td>1,500.00 0</td>
<td>MoHSW, MCDGC</td>
<td>25%</td>
<td>$855,000                      Cost per beneficiary is $ 1.9</td>
</tr>
<tr>
<td>Insecticide treated bed nets and iron pots for all pregnant women</td>
<td>1,500.00 00</td>
<td>MoHSW</td>
<td>0%</td>
<td>$0</td>
</tr>
<tr>
<td>Enhancing complementary feeding and food fortification for wasted children</td>
<td>180,000</td>
<td>MoHSW</td>
<td>25%</td>
<td>$630,000                      $ 14 / beneficiary</td>
</tr>
<tr>
<td>Total investment costs borne by the nutrition sector</td>
<td></td>
<td></td>
<td></td>
<td>$3,380,000</td>
</tr>
</tbody>
</table>

56
5. STRENGTHENING IMPLEMENTATION

118. Enhancing the efficiency of implementation is not only a way to free resources for essential nutrition services it will enhance the credibility of the nutrition sector when it argues for additional resources. And despite achieving some remarkable results with respects to iodization, deworming and vitamin A supplementation performance in the nutrition sector is not optimal. Too often, implementation is done from Dar es Salaam. Pet projects are frequent, results are not monitored on a routine basis and coordination between development partners and TFNC, or between TFNC and other Ministries, Departments and Agencies is limited at best.

119. This chapter formulates an agenda to achieve more efficient implementation mechanisms. To this end reform is proposed in five areas:

- Focus the nutrition program on priority areas;
- Improve the efficiency of the delivery of the nutrition program;
- Strengthen coordination between various actors in nutrition;
- Enhance demand for and accountability of nutrition services;
- Strengthen monitoring and evaluation.

5.1 Focus the nutrition program

120. A first priority to achieving efficient implementation is alignment of the work program with the nutrition agenda outlined in chapter 4. This agenda was prepared with a realistic resource constraint in mind and focuses on (i) addressing vitamin and mineral deficiencies, (ii) prenatal care and care and feeding practices for young children, (iii) improving the efficiency of delivery and financing mechanisms and (iv) building a constituency for more ambitious nutrition interventions in the future.

121. Work is needed to align existing work programs of all partners in nutrition with the identified priorities. TFNC’s new Strategic Plan which was developed according to the guidance of the Government’s Public Service Management, has already done so and identified 3 “key results areas” and 16 objectives for the 5-year strategic plan period, but additional pruning may be needed. Other programs also require alignment. UNICEF’s work program, for instance, focuses much of its activities (and budget) on a pilot to demonstrate models of interventions for scaling up in relation to three outcome areas: diseases prevention and health promotion, safe motherhood and newborn health and nutrition and early childhood development. However, the work plan (see Box 5.1 and Annex F) is so ambitious and the number of (sub)-objectives so large (29) that it is seems highly unlikely that this approach will lead to scalable interventions.
An illustration of a less focused pilot is implemented as part of the Youth and Child Development program (YCD). This program intends to demonstrate models of interventions for scaling up in relation to three outcome areas: diseases prevention and health promotion, safe motherhood and newborn health and nutrition and early childhood development. The pilot will spend approximately $3 million per annum in six districts: Temeke, Makete, Mtwara Rural, Morogoro Rural, Magu and Hai with a total estimated number of 360,000 children under the age of 5 (i.e. about $8 per child per annum).

In addition to its 3 overarching outcomes, the pilot has 16 objectives and 13 sub-objectives, making it almost impossible to come up with tested results and a scalable package (see also Annex F).


5.2 Improve efficiency in delivering the nutrition program

122. To advance nutrition given the existing budget, resources need to be spent efficiently. Currently, HKI and TFNC spend about one third of their resources on administration (including wages and salaries) and two thirds on investments (Table 4.5). In other words, of every $3 that is available for nutrition $1 is spent on activities with no direct impact on nutrition outcomes. If the announced reduction in TFNC's budget for the year 2007/2008 becomes a reality and administrative expenses are not reduced, TFNC may end up spending as much as 60% of its resources on administration. The outlays for administration are such that it should be explored whether resource savings are feasible. At the very least the evolution of administrative expenses needs to be monitored over time and targets set to achieve efficiency gains.

123. The rapid changes in Tanzania's institutional landscape have implications for the way a nutrition program is best delivered. These changes center around decentralization, public service reform and donor coordination. The Government of Tanzania is committed to decentralization by devolution and has put in place an administrative structure which provides for planning and management by local authorities in rural villages, urban mtaa and district and urban councils. The delivery of most of the public services is the responsibility of local government authorities, and the central ministry to which they report, the Prime Minister's Office - Regional Administration and Local Government (PMO-RALG). Local Government Authorities at district level receive the bulk of their financing through subventions from central government. A district development plan is prepared as part of the planning and budget process. Assessments of plans in several districts have revealed that nutrition is occasionally mentioned as a development problem and that there is only a limited understanding of how to deal with nutrition problems at local government levels (Leach 2007). As a consequence, nutrition does not feature in local government's plans. If nutrition is to be addressed more seriously it requires the identification, training and supervision of nutrition "champions" or focal points at the district level, the inclusion of nutrition in local government's plans and budgets and a TFNC that provides guidance and technical backstopping.
Within TFNC there is a growing recognition that decentralization requires reform and an approach whereby implementation is the prime responsibility of local government authorities (or other private entities and NGOs) while TFNC remains with the responsibilities of capacity development, supervision and monitoring, resource mobilization and technical back stopping (TFNC 2004c). TACAIDS may serve as a model here. Like nutrition addressing HIV/AIDS is associated with health interventions but requires, in practice, a multi-sectoral approach. TACAIDS delivers this by providing strategic leadership, by facilitating the pooling of financial resources and by coordinating the implementation of HIV/AIDS interventions. To remain focused, TACAIDS refrains from implementation. Rather it delegates execution of activities to local government authorities and private actors. This allows the agency to be effective with only a limited number of professional staff. TFNC could learn lessons from this example for its own structure and staffing. It implies de-emphasizing implementation and greater attention to strategic planning, guideline development, backstopping, monitoring and evaluation, as reflected in the 1973 Act which established TFNC. This Act mandated TFNC with nutrition policy formulation, planning, harmonization, advocacy, research, training, facilitation, coordination, monitoring and evaluation of nutrition services in the country.
Box 5.2: Functions of TACAIDS do not include implementation

Functions of TACAIDS are:

- To formulate policy guidelines for the response of HIV/AIDS epidemic and management of its consequences in mainland Tanzania.
- To develop Strategic Framework for planning of all HIV/AIDS control programs and activities within the overall national strategy.
- To foster national and international linkages among all stakeholders through proper coordination of all HIV/AIDS control programs and activities within the overall national strategy.
- To mobilize, disburse and monitor resources and ensure equitable distribution.
- To disseminate and share information on the HIV/AIDS epidemic and its consequences in Tanzania and on the programs for its control.
- To promote research, information sharing and documentation on HIV/AIDS prevention and control.
- To promote high level advocacy and education on HIV/AIDS.
- To monitor and evaluate all ongoing HIV/AIDS activities.
- To coordinate all activities related to the management of the HIV/AIDS epidemic in Tanzania as per National Strategy.
- To facilitate efforts to find a cure, promote access to treatment and care, and develop vaccines.
- To protect human and communal rights of people infected and affected with HIV/AIDS.
- To promote positive living among people living with HIV/AIDS.
- To advise the government on all matters relating to HIV/AIDS control in Tanzania mainland.
- To identify obstacles to the implementation of HIV/AIDS prevention and control policies, programs and ensure the implementation and attainment of programs, activities and targets.
- To promote all activities related to the prevention and control of HIV/AIDS epidemic in particular regarding the following:
  (i) health care and counseling of HIV/AIDS patients
  (ii) the welfare of the bereaved orphans and survivors of HIV/AIDS victims
  (iii) the handling of social, economic, cultural and legal issues related to the epidemic.
- To perform such other activities and functions related to the prevention and control of HIV/AIDS epidemic in Tanzania mainland as the commission may deem necessary.

Source: TACAIDS

125. Enabling TFNC requires a careful assessment of what should be implemented by TFNC itself and what not. TFNC staff is, at present, extensively engaged in the execution of research, implementing surveys, and training, information and communication activities. Much of this could be left to others, local government authorities and private entities (NGOs, firms) alike. For instance one of the activities regularly undertaken by TFNC are household surveys. Apart from ensuring that technical nutritional aspects are reflected in questionnaires and ensuring that enumerators are appropriately trained on nutrition, TFNC has no comparative advantage in survey implementation. Sampling, field work and data processing are best left to professionals who specialize in this kind of activity. TACAIDS could, again, serve as example. It sponsors, every four years, a nationally representative HIV/AIDS survey. This survey is executed by NBS and included in the National Survey Program which pays
70% of the survey cost. TFNC too should aim to work towards greater integration of nutrition in existing national surveys such as the Household Budget Survey (already collects detailed information on food items), Demographic and Health Survey (collects anthropometric information as well as information on micro-nutrients), HIV Indicator Survey, Agricultural Sample Census or the planned Income and Expenditure or National Panel Surveys.

126. Strengthening TFNC will be not be easy, nor is this report the first to identify the need for it. For instance, the 1987 joint TFNC/SIDA evaluation concludes that ... ‘It is important to decentralize and to post nutrition officers at the regional offices, whereas TFNC provides back-up facilities in terms of advocacy, problem identification, training and project planning efforts’ (Burgess et al. 1987, page 12). And the 1979 evaluation of TFNC, cited in the 1987 report, established that research on food science and technology can very well be left to the combination of the Bureau of Standards, Tanzania Food and Drug Agency, Food Quality Control Commission, the Food Science and Technology Department at Sokoine University and Industrial Development Institute. As both these reforms have not taken shape to date, it will be important to ensure that any proposals for reform are realistic and that an approach is found to implement them.

127. Public service reform is another aspect of the changing institutional landscape deserving attention. Public sector reform is implemented by PO-PSM. It is an ongoing process, aimed at improving the efficiency of the public service, amongst others through performance monitoring, improved planning and budgeting, and pay reform. Public service reform, if fully embraced, can be an important tool towards ensuring an increased focus on core deliverables, through annual reporting against outputs agreed upon in the budget process, through a tri-annual reporting against outcomes and by implementing the Open Performance Review Appraisal System (OPRAS). TFNC’s status as an autonomous agency provides it furthermore with some flexibility at reviewing salary scales. If implemented in conjunction with tightly monitored OPRAS, reviewed salary scales could reduce the extent to which allowances for field work and workshops act as salary top-ups and take away professional time from core deliverables. At the same time, it would create a dam against the outflow of experienced professional staff in search of greener pastures that TFNC is experiencing at the moment. The Second Public Service Reform Program which is currently being formulated by the Government of Tanzania with assistance from the World Bank comprises a component that deals with enabling (semi) autonomous Government Agencies. It provides a good opportunity to take forward the envisaged strengthening of TFNC.

128. Donor coordination, finally, is another significant change in the institutional landscape. With the Joint Assistance Strategy for Tanzania (JAST) there is a growing recognition of the necessity for government leadership and for coordination between development partners and government, national ministries and local authorities alike. As the national institution for nutrition, TFNC, will be the natural counterpart providing guidance to development partners. To this end, development partners will need to formalize their existing informal coordination arrangements and establish a nutrition Sector Working Group (SWG) under the DPG architecture. Such a group would ensure coordination amongst development partners, ensure agreement on a joint work program and streamline communication on nutrition in the work of Cluster II, in MKUKUTA monitoring, the PER cluster work and the GBS annual review. And by reporting towards the Heads of Corporation on a regular basis, a nutrition Sector Working Group would contribute to assuring high level support for nutrition.
129. With the JAST there is also a move away from project support towards pooling of resources under Sector Wide Approaches (SWAp) or as General Budget Support (GBS). For instance, under its new country strategy, UNICEF will channel resources for micro-nutrient interventions through the Health SWAp. To assure that the money is used for the intended purposes, it requires inclusion of vitamin A supplementation and deworming in local government plans at budgets as well as those of the Ministry of Health and Social Welfare. It also requires that the formula used to determine the financial allocations for local authorities reflect district requirements to achieve nutrition outcomes. And, it requires that nutrition is brought to the attention of central policy makers—in Ministry of Finance, but also the development partners, so that nutrition activities are adequately resourced. This can only be achieved with clear advocacy, coordination and guidance from the center (TFNC and its partners).

5.3 To advance nutrition, coordination needs to be improved

130. Malnourished people have little political or economic influence—if at all they are aware of their predicament, and are ill positioned to demand assistance or to compete for scarce resources. Nutrition is, at best, a minor concern to ministries and government agencies and, apart from TFNC, a major concern of none. As the national institution for nutrition, TFNC will not only have to ensure that nutrition remains on the political agenda it will also need to facilitate a coordinated approach to tackling malnutrition.

131. Coordination between four types of actors can be distinguished: between TFNC and other MDAs, between development partners, between TFNC and development partners and between TFNC and the private sector and NGOs.

132. Coordination between TFNC and other MDAs. Activities with positive outcomes for nutrition are implemented by various ministries, agencies and projects. TFNC has the challenging task to not only supervise, regulate, mobilize resources, and provide nutrition related policies and guidelines it also has to advocate for nutrition and make sure nutrition is on the agenda of all these MDAs. In addition TFNC has to provide oversight on the implementation of nutrition related activities. Special attention should be given to coordination with local government authorities as with the ongoing decentralization most implementation activities will be initiated by local government. It underlines the importance of identifying, guiding and supervising nutrition focal points in the districts so as to facilitate the integration of nutrition activities in budgets and actions plans and making sure that they are held accountable for advancing in the fight against malnutrition.

133. It has been suggested (e.g. Leach 2007) that for TFNC to truly advance the cause of nutrition, it should work with a central committee for nutrition, possibly established with the Ministry of Planning, Economy and Empowerment (MPEE) which also has responsibility for MKUKUTA and its monitoring process. As part of its responsibility for overall planning guidelines, MPEE the ministry also chairs the budget guidelines committee. A national committee for nutrition, established in this central ministry, could more easily attract the participation of key planners and decision makers in multi-sectoral discussions than is now usually the case. International experiences suggests that it matters less where nutrition coordination is situated in the administrative structure of government as long as the coordinating agency receives high level support, backed by strong political and bureaucratic commitment and is able to influence resource allocation between MDAs, so as to give implementing agencies an incentive to perform (World Bank 2006).
134. **Coordination between development partners.** Various agencies in Tanzania work on nutrition. Steps towards greater coordination have been taken and on a regular basis an informal nutrition partnership group comprising UNICEF, WHO, WFP, HKI, USAID and the World Bank meets. This group would benefit from formalization as it would increase its visibility, would make it accessible for those interested but not yet active in nutrition and would make it the natural interlocutor between development partners and government. The most likely place for such a group would be under the DGP-architecture. Within this structure, a nutrition group could coordinate nutrition activities, report to the Heads of Corporation, collaborate with other Sector Working Groups in Cluster I and Cluster II (health, water, agriculture, education, private sector) and coordinate the development partners’ efforts with government.

135. **Coordination between TFNC and development partners.** With a nutrition SWG in place, and with TFNC coordinating the Government’s response, coordination between TFNC and development partners should be straightforward. The collaboration should be used to discuss annual work programs, to align implementation activities (when development partners are involved in implementation), to exchange technical information as well as information on budgets and to agree on a common results framework that is monitored on a regular basis and that forms the basis for next year’s work program.

136. **Coordination between TFNC and non-government actors.** Nutrition is not only a public sector affair and it is important to harness resources that exist outside government. Fortification of foodstuffs like maize, sugar, oil or otherwise, is one area where there is scope for collaboration with the private sector. It requires building an alliance with industry on issues relating to research, technology, food processing and marketing, standards, quality assurance, product certification, social communications and demand creation. Likewise, public-private partnerships could be established for social marketing for instance by putting nutrition messages on packaging. Collaboration with non-government entities need not be limited to the food industry. Partnerships could be built with other commercial entities or with NGOs and their capacities could be used for monitoring, advocacy and for activity implementation. Contracting private entities will pose a management challenge as it requires oversight, making it essential that adequate capacities exist in procurement, monitoring, and accounting. But private entities have proved flexible, highly motivated and skilled (World Bank 2006). This justifies greater collaboration with them, if only, initially, on a limited (pilot) basis. And because private entities are employed on a contract basis, they can be phased in when more resources for nutrition arrive and phased out once malnutrition rates decline—an exit strategy that is very difficult to implement in programs that rely on government field staff.

5.4 **Enhanced demand for and accountability of nutrition services**

137. Demand for nutrition services and accountability about actual deliveries are powerful mechanisms to improve performance. By identifying a set of indicators and targets priorities in the work program are clear and through a regular reporting against these targets accountability will help identify whether activities are on track, whether results are achieved and whether programmatic changes are desirable.
138. Various formal and informal accountability mechanisms are in place in the nutrition sector. TFNC, for instance, reports to its Board and to the Ministry of Health and Social Welfare. With the latter there exists a service agreement that specifies what TFNC will deliver in return for its core budget. TFNC also reports to the MKUKUTA secretariat on progress against the nutrition indicators included in the MKUKUTA monitoring framework. Staff in TFNC are accountable towards management as specified in the performance agreements that are entered between supervisors and subordinates. Development partners have agreed with the JAST to provide aid on the basis of principles of national ownership, government leadership, harmonization and alignment.

139. In practice the implementation of the accountability mechanisms are weak. Service agreements and performance agreements are not effectively used. Progress against pre-agreed targets is not assessed, and not meeting targets does not have financial, disciplinary or other implications. There is only limited coordination between TFNC and development partners and work plans are aligned to a limited degree only. Partnership meetings take place infrequently and most DP-TFNC interaction takes place on an ad-hoc, bilateral, basis.18

140. Limited accountability is not unique to nutrition and with the 2007-2008 Budget Guidelines, Government seeks to improve the situation by demanding that MDAs prepare annual performance reports (APRs) and three-yearly outcome reports (URT 2007). Annual performance reports need to provide progress information on indicators by presenting targets and demonstrating performance against these targets. Outcome reports take a deeper look at a sector and assess the degree to which objectives are actually being met. With the APR and outcome reports the instruments needed for improved accountability within Government are largely in place. The challenge will be to use these tools such that they actually increase performance.

141. Whereas the tools for accountability within Government are largely in place, this does not hold for accountability amongst donors, between TFNC and donors and towards the public at large. The accountability between donors would be improved by the formation of a nutrition Sector Working Group, mentioned in section 5.2. By reporting directly to the Heads of Corporation and through peer pressure work a nutrition SWG would help aligning donor programs with the national strategy.

142. Accountability between TFNC and development partners and towards civil society would be strengthened through a greater focus on creating demand for nutrition services and through an Annual Nutrition Review. Demand for nutrition services from e.g. health facilities could be enhanced through social marketing campaigns or by using volunteers who have been trained in nutrition (as Thailand has very successfully done –World Bank 2006), whereas demand for nutritional services from the center would be enhanced by the appointment of nutrition focal persons in the districts. An Annual Nutrition Review would bring together representatives from TFNC, MoHSW, civil society, development partners and other actors involved nutrition (Local Government; other MDAs; private sector) and through analysis arrive at a common understanding about last year’s performance, would assess needs for change and would agree on a common plan of activities for the coming year with (revised) indicators and targets. An annual review would monitor the performance of TFNC but would equally assess whether development partners are meeting their JAST obligations.

18 This is not to say that no accounting takes place. TFNC has regular reporting to its Board and the Ministry of Health and Social Welfare. TFNC also accounts to the public through the parliamentary process.
143. An Annual Nutrition Review does not exist at the moment, but it would be worthwhile to set one up. The Health Sector Review may serve as a template, but sector reviews can be structured in different ways as long as they comprise the elements of analysis, performance monitoring, agreement on a common work program and accountability to the general public. One aspect that would have to be carefully considered would be timing such that the information can feed into government processes (budget guidelines) and other processes (e.g. Health Sector Review; PRBS annual review). To ensure relevance satisfactory performance on the Nutrition Review would have to be incorporated in the PAF of the PRBS.

5.5 Monitoring and Evaluation

144. Monitoring and evaluation (M&E) allows learning from past experience, improves service delivery, planning and allocating resources, and helps to demonstrate results as part of accountability to key stakeholders. A good monitoring and evaluation system is crucial to advance nutrition as it provides feedback on the progress of program implementation. In the absence of reliable, unbiased and timely data it will not be possible to assess whether nutrition interventions are effective, whether targets are met and what may have to be done to further improve performance. Accountability is not possible in the absence of information. Without analysis it is impossible to integrate lessons learned into future programming.

145. Monitoring encompass information about outcomes, outputs as well as inputs. For instance to reduce child mortality (outcome), it is necessary to know who benefited from vitamin A distribution (output), which in turn depends on coordination activities implemented by TFNC and the districts (input). Information is needed on all these aspects, whether related to operational and administrative activities of TFNC and the districts, the implementation of activities or the outcomes of these activities. Monitoring should not only focus on collecting information about input, output or outcome indicators, for a better understanding of what works and what does not work, additional information may have to be collected. For instance if a vitamin A campaign only reaches 80% of the target population, it is useful to know whether this is related to household characteristics (e.g. the poor do not benefit) or related to spatial characteristics (e.g. households in isolated areas are underserved). It requires a robust system of data collection, and an ability to analyze these data.

146. Information for monitoring can be obtained from TFNC’s Management Information System, other MIS systems, including the Health Management Information System (HMIS) and household surveys. At present none of these systems functions optimally. TFNC’s management information system is rudimentary and not computerized. The HMIS has its own problems, including the fact that information on anthropometric status is not collected systematically, even though this could be done, e.g. as part of the measles vaccination. The HMIS could be used for monitoring in other ways as well. For instance there is a need to monitor the effect of Vitamin A campaigns and documentation of vitamin A supplementation campaign contacts on routine maternal and child health cards would be a simple step to facilitate this monitoring (Masanja et al. 2006). The ongoing household survey program as implemented by NBS could provide very valuable nutrition information, for instance by including anthropometric indicators in the HBS and through a closer coordination with the various DHS surveys.
Box 5.3: Actions for improved efficiency

- Focus nutrition activities on those with the highest benefit-cost ratios and align the National Nutrition Strategic Plan and donor work programs with the proposed nutrition agenda.
- Include responsibility for nutrition outcomes in work program of MoHSW and strengthen oversight by the Ministry on TFNC in part through the appointment of a nutrition desk officer.
- Implement and effectuate OPRAS (within TFNC) and service agreement between TFNC and MoHSW.
- Prepare annual performance reports and three yearly outcome reports
- Create a department (preferably in TFNC) charged with coordination nutrition activities with other Ministries, Local Government and programs and projects
- Identify and train nutrition focal persons in all districts, include nutrition activities in district plans and budgets and hold focal persons accountable for progress in nutrition.
- Establish a nutrition SWG that reports to Heads of Corporation
- Create greater demand for nutrition services and strengthen monitoring and evaluation through surveys and the HMIS.
- Establish an Annual Nutrition Review (ANR) that reviews performance against pre-agreed indicators and targets and that identifies priorities for next year.
- Reach agreement on objectives, approach and timing for restructuring TFNC.
- Enter a social contract for reform in nutrition with high level support.

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5.6 Conclusion

148. Improving the performance of the nutrition sector is a key element towards more effective nutrition services in Tanzania. This chapter has proposed reforms affecting all major actors, the development partners, TFNC, the Ministry of Health and Social Welfare and District Authorities.
149. Reform requires commitment, and a clear timeline within which it will be accomplished. Development partners should form a nutrition Sector Working Group over the next six months and purge from their programs elements not in line with the nutrition agenda. Districts should identify nutrition focal points over the course of next year, and TFNC has to ensure they receive training and guidance and provide an accountability framework. The effectiveness of TFNC should be enabled and the Center should return to its mandate and focus on coordination, training, monitoring and providing guidance. Doing so will involve substantial restructuring and an alignment of TFNC’s staffing with its tasks and functions. Doing so will high level support that could be obtained by establishing a social contract in which the partners in nutrition, TFNC, TFNC’s Boards, development partners, Ministry of Health and Social Welfare commit to carrying out their share of the bargain. Other ways to ensure that reform will actually happen should also be explored.

150. Enhanced demand for nutrition services and accountability for results achieved are key to ensuring that reforms are actually implemented. OPRS, annual performance reports and three annual outcome reports are—in theory at least, important tools to enhance a focus on results within the public sector. The Ministry of Health and Social Welfare, as the parent ministry for TFNC, will have to include nutrition outcomes in its own performance reporting and hold TFNC accountable for delivering against it. Development partners involved in nutrition will need to abide by the JAST principles and will have to hold each other accountable through peer review and by reporting regularly to the Heads of Corporation.

151. Ad ultimo, good nutrition is a matter of all Tanzanians. An Annual Nutrition Review whereby in a forum accessible to all domestic stakeholders, progress in combating malnutrition is reviewed, performance is discussed and where the key elements for the future work program are agreed is an important element to enhancing accountability in the future. The National Nutrition Conference which TFNC organized in May 2007 is a first step towards such an annual review.
ANNEX A: COMMISSIONED PAPERS

1. Causes of malnutrition and Tanzania’s nutrition programs: past and present.  
   Tanzania Food and Nutrition Centre.

2. Trends in Malnutrition in Tanzania  
   Blandina Kilama and Wietze Lindeboom

3. The benefits of malnutrition interventions: empirical evidence and lessons to Tanzania  
   Adolf Mkenda

   Harold Alderman, Johannes Hoogeveen and Mariacristina Rossi

5. Preschool Nutrition and Subsequent Schooling Attainment: Longitudinal Evidence from Tanzania  
   Harold Alderman, Johannes Hoogeveen and Mariacristina Rossi

   Mariacristina Rossi

7. Institutional Analysis of Nutrition in Tanzania  
   Valerie Leach
ANNEX B: COMPARING NUTRITION OUTCOMES USING OLD AND NEW REFERENCE GROWTH TABLES.

In response to the WHO's recommendations in 1993 to develop new standards for infant and young child growth, the Multicentre Growth Reference Study (MGRS) was undertaken between 1997 and 2003 to generate new growth standards for assessing the growth and development of infants and young children. The MGRS is based on data from six distinct countries (Brazil, Ghana, India, Norway, Oman and the USA). In Africa, the study was conducted in Ghana. Compared to the former NCHS/WHO growth standards, the new growth standards describe how all children should grow when their needs are met. The new standards make breastfeeding the biological "norm" and establish the breastfed infant as the normative growth model. The new growth standards constitute an essential tool to accurately detect growth faltering in children and to measure the prevalence of malnutrition.

The updated WHO/NCHS reference growth tables have been released, leading to differences in prevalence rates. Using the old and new growth references tables, the prevalence of stunting and underweight is shown below for the years 1996, 1999 and 2004. The data suggests that using the latest series stunting is a more serious problem—with stunting rates exceeding 40%, while underweight is less of a problem. Irrespective of which reference tables are used, nutrition trends are comparable: i.e. no change between 1996 and 1999 and a significant drop between 1999 and 2004. The decline in stunting is somewhat less if one uses the new reference series.

Figure B.1: The prevalence of under-nutrition (%) according to old and new growth reference tables

Source: Author's calculations using various DHSes

A noteworthy difference between using the old and the new series is that at an early age more children are underweight. This is illustrated below for the fraction of children that are stunted. The difference disappears with age and by the age of 5 there is no discernable difference in rates of stunting depending on the measure used.

In the analysis presented in this report the old reference tables are used as this is the way in which the official numbers are currently calculated in Tanzania. Certain analyses in this report—such as the regression reported in chapter 3, were done using both old and new indicators, to verify whether the choice of indicator matters for results. This was found not to be the case.

**Figure B.2: Fraction of stunted children by age for new and old growth reference tables**

Source: Author's calculations using DHS 2004
Malnutrition is not unique to Tanzania. The maps presented at the beginning of this document demonstrate that the prevalence of underweight and stunting in Tanzania are not amongst the very highest in the world, they fall into the high category. Figure C.1 brings the comparison closer to Tanzania by presenting the prevalence of under-nutrition in Tanzania along with that in neighboring countries. It suggests that compared to most countries in the region, Tanzania does relatively well in stunting, underweight and wasting. Prevalence rates are at par with those in Uganda, better than those in Rwanda but worse than those in Kenya.

Figure C.1: Percentage of undernourished children under 5 years in Tanzania and it neighbors

![Graph showing prevalence of underweight, stunted, and wasted children in various countries.]

Source: DHS country reports.

Figure C.2 presents some evidence on micro-nutrients and the prevalence of exclusive breastfeeding for Tanzania and its neighboring countries. In these respects Tanzania’s performance is worse than that of its neighbors. For instance, the fraction of households using adequately iodized salt is amongst the lowest in East Africa. The same holds for the fraction of households that practice exclusive breastfeeding. Rwanda is an interesting case in point as it does well in most respects.

A lesson that can be drawn from this regional comparison is that there is scope for improvement. Countries at comparable levels of development do considerably better than Tanzania. Much can be learned from the effectiveness of iodine provision in Rwanda and Uganda and the high prevalence of exclusive breastfeeding in Rwanda.
Figure C.2: Nutrition related factors for children aged five and less in East Africa

Source: DHS country reports.
ANNEX D: UNDER-NUTRITION AND HIV/AIDS

It is estimated that 7.7% of women and 6.3% of men aged 15-49 years are infected with HIV, yielding a national average of 7.0% (DHS 2004). An increasing body of evidence has accumulated over the past several years on the links between HIV/AIDS and under-nutrition. Both HIV and under-nutrition negatively affect the immune system and increase the susceptibility to infections which often lower food intake as well as absorption. This, coupled with 10%-30% increased energy requirement of people living with HIV/AIDS (for HIV infected children experiencing weight loss energy needs increase by 50-100%) results in further under-nutrition (WHO 2003). For the same reason, HIV infected pregnant women gain less weight and experience more frequent vitamin and mineral deficiencies. Good nutrition enables HIV infected children to regain lost weight after opportunistic infection and HIV infected mothers during pregnancy and lactation to improve birth outcomes. Furthermore, adequate nutrition is necessary to maximize the benefits of ARV, by increasing the responsiveness of treatment and reduce the side-effects that come with compromised immune system.

An issue requiring attention is how to balance the well known benefits of breastfeeding and the risk of HIV transmission through breastfeeding—a risk that is high and constant throughout the breastfeeding period. The dilemma is that switching to replacement feeding means children miss out on the immunity transmitted through breast milk and so are more susceptible to death or malnutrition from other diseases. The situation is further complicated by the fact that most women in resource-poor settings do not know their HIV status, and there is still uncertainty about the risks associated with different feeding alternatives (such as increased diarrheal disease, stigma associated with not breastfeeding, and spillover effects of formula feeding to mothers who are not HIV -positive). Furthermore, even women who know their status and choose alternative feeding often fall in the trap of mixed feeding (breastfeeding mixed with alternative milks), an option shown to carry the highest risk of transmission. This default to mixed feeding is usually driven by cultural factors, social stigma, or the unavailability of or infeasibility of using breast milk on a continuous daily basis in hot, humid, resource-poor environments. Recent findings on the lower risks of transmission through exclusive breastfeeding, compared with mixed feeding, warrant the promotion of exclusive breastfeeding until further evidence is available (World Bank 2006, WHO 2006).
ANNEX E: EXCLUSIVE BREAST FEEDING?

UNICEF and WHO recommend that children be exclusively breastfed (no other liquid, solid food, or plain water) during the first six months of life (World Health Assembly, 2001 cited in DHS 2005). Reasons for this include that introducing breast milk substitutes to infants before six months can contribute to breastfeeding failure and that substitutes are often watered down and provide too few calories. Possible contamination of these substitutes is another reason for the guideline.

To establish the beneficial effect of exclusive breastfeeding on a child’s development, weight of children up to 6 months of age was regressed on a number of control variables, age and an interaction term of age with and whether the child is exclusively breast fed. If exclusive breast feeding has a positive effect on nutritional status, this interaction term is expected to be positive. Weight was the preferred dependent variable as other nutritional measures were considered too inaccurate for children of this age.

The remarkable finding is that exclusive breastfeeding does not have a significant effect during the first two months of life and a significant negative impact during months 3 and 4. The impact for month 5 is insignificant—possibly due to the small number of observations. As only 2 children aged 6 months were exclusively breast fed, this variable was dropped from the regression.

Various variants of the regression were tried, including using an indicator variable for underweight, and with different control variables including access to safe water, diarrhea or without the control for birth weight. The absence of a positive impact of exclusive breast feeding held throughout.

Table E.1. OLS regression on weight for children aged 0-6 months

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>T-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household size</td>
<td>-0.077</td>
</tr>
<tr>
<td>Dependency ratio</td>
<td>-0.662</td>
</tr>
<tr>
<td>D-female head</td>
<td>2.745</td>
</tr>
<tr>
<td>Age of mother</td>
<td>0.057</td>
</tr>
<tr>
<td>Years of education of mother</td>
<td>0.142</td>
</tr>
<tr>
<td>D-male</td>
<td>3.594</td>
</tr>
<tr>
<td>D-twin</td>
<td>-4.602</td>
</tr>
<tr>
<td>D-aged 1 month &amp; exclusive breast feeding</td>
<td>2.026</td>
</tr>
<tr>
<td>D-aged 2 months &amp; exclusive breast feeding</td>
<td>-1.661</td>
</tr>
<tr>
<td>D-aged 3 months &amp; exclusive breast feeding</td>
<td>-4.733</td>
</tr>
<tr>
<td>D-aged 4 months &amp; exclusive breast feeding</td>
<td>-6.513</td>
</tr>
<tr>
<td>D-aged 5 months &amp; exclusive breast feeding</td>
<td>-4.636</td>
</tr>
<tr>
<td>D-aged 1 month</td>
<td>5.415</td>
</tr>
<tr>
<td>D-aged 2 months</td>
<td>18.085</td>
</tr>
<tr>
<td>D-aged 3 months</td>
<td>26.538</td>
</tr>
<tr>
<td>D-aged 4 months</td>
<td>31.472</td>
</tr>
<tr>
<td>D-aged 5 months</td>
<td>35.174</td>
</tr>
<tr>
<td>D-aged 6 months</td>
<td>37.365</td>
</tr>
<tr>
<td>Birth weight in kilograms</td>
<td>6.749</td>
</tr>
<tr>
<td>Constant</td>
<td>10.138</td>
</tr>
</tbody>
</table>

Source: Author’s calculations using DHS 2004.
ANNEX F: OBJECTIVES OF THE YOUTH AND CHILD DEVELOPMENT PROGRAM

The Youth and Child Development Program has 3 overarching outcomes, the pilot has 16 objectives and 13 sub-objectives.

A. Disease Prevention and Health Promotion aims at developing:

1. more targeted and focused household visits for C-IMCI addressing most vulnerable children under 5 years;

2. extension of household dialogue around child care practices to include group dialogue;

3. strengthened EPI surveillance systems and

4. integration of birth registration.

5. Under the Water, Sanitation and Hygiene it will also support
   a. community management and maintenance of water supply and sanitation facilities,
   b. sanitation marketing and
   c. promotion of appropriate hand-washing and hygiene behaviors.

B. Safe Motherhood and Newborn Health includes strengthening continuum of care for mothers and infants by improving:

6. access to, quality of and linkages between facility and community-based antenatal, delivery and post-natal services;

7. basic emergency obstetrical care,

8. promotion of health facility deliveries,

9. safe home deliveries,

10. Facility IMCI and post-natal outreach services,

11. Adaptation of Community IMCI to incorporate home-based newborn care. To this end Community PMTCT services will be integrated to promote
   d. early antenatal attendance and male involvement,
   e. increase uptake of counseling and
   f. testing by mother and partner,
   g. improve tracking and follow-up, and
   h. utilize lay counselors and community groups.
12. Paediatric AIDS by:

i. testing, improving access to paediatric ARVs and prophylaxis and
j. improving linkages between PMTCT and Maternal and Child health services,
k. PMTCT and Care and Treatment Centres and Care and Treatment services with Home Based Care and
l. provisions for orphans and vulnerable children.

C. Nutrition and Early Child Development includes:

13. strengthening district and community capacities for delivery of comprehensive nutrition interventions integrated with health and early child development interventions,

14. strengthening capacities of service providers, communities and families to manage and implement community nutrition interventions as part of a minimum integrated package of services for scaling up.

15. combining parenting education for early stimulation and

16. developing affordable group childcare options that integrate early learning, nutrition and health interventions while freeing women to engage in work.
Pilot interventions will be needed to identify, test and adapt new interventions. When designing pilots, they should be FIRST. Focused, International best practice, Realistic, Scalable and Tested.

- **Focused.** The ultimate objective of pilots is to show impact so that they can be scaled up. It requires (i) establishing “success” and (ii) an intervention package that can be brought to scale. Both requirements make it necessary not to overload a pilot. Christmas tree type approaches (see annex F.) are bound to be unsuccessful as testing can only be done on clearly defined interventions while complex design makes it hard to arrive at a package that can be replicated.

- **International best practice.** Nutrition is an active field. New results are published on a continuous basis and innovative approaches tested and documented. During its design, pilots should benefit from this pool of global knowledge, identify interventions that have worked elsewhere and focus on adapting them to national circumstances.

- **Realistic.** With sufficient resources, human, financial or organizational, results are almost assured. In practice resources are scarce and a pilot needs to be aware of this reality. The closer a pilot resembles true circumstances (limited financial resources, implementation through local authorities, partially informed or motivated staff) the more trustworthy will be its results. With the benefit of hindsight the Iringa program is an illustration of an unrealistic program. The program managed to achieve impressive results due to, in part, huge inflows of human and financial resources and organizational talent. But the program could never have been brought to scale in a satisfactory manner and was too expensive to be sustained, even in Iringa alone.

- **Scalable.** Pilots typically will test approaches that, if successful, will be implemented nation wide. Scalability should be of concern right from the design phase of the pilot as what works in a small number of sites may not work when all 12,000 communities in Tanzania need to be reached. The pilot to fortify maize through hammer mills in Iringa, Handeni and Korogwe presents an approach that is likely to achieve results but which cannot be scaled up. Already TFNC is facing serious challenges in reaching the 6,000 odd small salt producers for its iodine supplementation program. In the absence of a solution to reach the small salt producers, it is unclear how an ever more ambitious program of reaching all hammer mills can be successful.

- **Tested.** To establish whether results are achieved, pilots need to invest in monitoring and evaluation. The gold standard is one where a baseline is carried out before the pilot is implemented, where the pilot is executed in a randomly selected number of communities, leaving other baseline communities as control group. To allow proper testing and comparisons across different approaches, the pilot needs to implement one intervention per (group of) communities. Following the conclusion of the pilot, a follow up survey is needed to establish impact. During the course of the pilot a monitoring system will have to keep track of the inputs and outputs that can be recorded in an administrative fashion.
REFERENCES


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