

Helpdesk Report: Education interventions and their impact on nutrition Date: 16 October 2012

Query: Produce a report focused on nutrition interventions and their impact on school age children.

In addition, also consider a focus on any nutrition impacts on children of under two years of age (possibly indirect i.e. through intergenerational channels).

Enquirer: DFID Pakistan

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1. Overview

Nutrition interventions in schools

General school health and nutrition programmes

School health and nutrition programmes are a way to apply the simple effectiveness of global health interventions to deliver large gains in education. School health and nutrition programmes are clearly a quick fix in the efforts towards Education for All.

Experience from existing school health and nutrition programming suggest some key elements which are common contributors to success in many programmes:

- Focus on education outcomes
- Develop a formal, multi-sectoral and multi-disciplinary policy
- Initiate a process of wide dissemination and consultation. Promote the active involvement of parents, communities and local government. Explore opportunities for appropriate public-private partnerships to support health and nutrition education and improvements in the school environment.
- “Local action” is possible; backing it up at national level is better. Ensuring governmental support will help individual schools to take on similarly comprehensive health-promotion initiatives.
- Explore funding opportunities among bilateral and multi-lateral donors and NGOs.

- Use the existing infrastructure as much as possible. Consolidate and strengthen ongoing school-based nutrition programmes.
- Build the programme around simple, safe and familiar health and nutrition interventions:
 - Provide primary support from public resources
 - Be inclusive and innovative. Advocate for the integration of nutrition education into the school curriculum for all age groups.
 - Review existing teaching/learning materials on school nutrition education and promote the adaptation of available, or the development of new materials in line with local needs and conditions
- Nutrition education should always employ a wide range of hands-on teaching/learning methods.
- A “health promotion” approach enhances the effectiveness of nutrition education.
- The inclusion of women social workers was an investment that proved to be very successful.
- Promote the establishment of school gardens as an integral part of school nutrition programmes. The availability of water points to cover the increasing water needs generated by gardening activities is essential for the success of such a project. Gardening projects results are both rapid and visible and are very motivating for communities and help improve participation in other development and public health initiatives.
- School health projects with a service delivery component need to ensure that permanent mechanisms are established for supplying schools with essential drugs and micronutrients to avoid the possibility of stock-outs or wastage. Negotiating the sustainability strategy with the communities at the onset of the programme also contributes significantly to its success.
- A well thought-out expansion strategy that can be implemented as soon as programmatically possible is also important.
- Common health, education, and nutritional outcomes and programmatic processes should form the basis of a generic M&E framework for any school health and nutrition programme.

Micronutrients

Multiple micronutrient food fortification can improve micronutrient status and reduce anaemia in schoolchildren. Considering the vast number of school-age children suffering from MMN deficiencies and the consequences, the overall impact of MMN interventions in school-age children can be an investment in future generations by helping these children to achieve optimal health and increase their potential to learn.

School-age children are important beneficiaries to target for micronutrient programmes as they are undergoing substantial physical and mental development and therefore have nutritional demands beyond those of other populations. A second reason that nutrition is often provided in school is to create additional incentives for children to attend school, and thereby reduce the net costs of schooling for parents.

School feeding

There is evidence that school feeding programmes increase school attendance, cognition, and educational achievement, particularly if supported by complementary actions such as deworming and micronutrient fortification or supplementation. School feeding provides an entry point for other interventions.

School feeding may not have any significant impact on the nutrition of younger children.

Home-grown school feeding (HGSF) combines quality local agricultural production and traditional school feeding. It is based on the premise that low farm productivity, poor agricultural market development and poor educational and nutritional outcomes are mutually reinforcing and jointly determine key aspects of rural hunger and poverty.

Community involvement promotes community ownership and this is key to successful and sustainable school feeding operations.

School feeding programmes must be carefully consider the potential negative effect of increasing enrolments in schools that are not prepared and have not planned for the large numbers of children.

Morbidity among the school children has been shown to go down considerably after the introduction of the school feeding programme.

Children are supposed to eat three square meals a day, but there is some evidence that parents are stopping breakfast at home if a lunch is provided in school.

De-worming

School-age children typically have the highest intensity of worm infection of any age group. In addition, the most cost-effective way to deliver de-worming pills regularly to children is through schools because schools offer a readily available, extensive and sustained infrastructure with a skilled workforce that is in close contact with the community. With support from the local health system, teachers can deliver the drugs safely.

Nutrition interventions for school age children

Improved hygiene

Interventions that promote hand washing can reduce diarrhoea episodes by about one-third. This significant reduction is comparable to the effect of providing clean water in low-income areas.

The complex problem of child undernutrition will not be solved with toilets and hand washing alone. Interventions focused on gut microbial populations and improved drinking water quality might be important, together with continued efforts to improve infant diets.

Cash transfers

Households receiving transfers spend more on food, resulting in significant gains in children's weight and height in several countries.

Conditional cash transfer programmes appear to be an effective way to increase the uptake of preventive services and encourage some preventive behaviours. In some cases programmes have noted improvement of health outcomes, though it is unclear to which components this positive effect should be attributed.

Zinc supplementation

In developing countries, diarrhoea causes around two million child deaths annually. Zinc supplementation during acute diarrhoea is currently recommended by the World Health Organization and UNICEF. There is evidence of a beneficial effect of therapeutic zinc supplementation in the reduction of the duration of acute and persistent diarrhoea.

Adolescent nutrition

Important findings on adolescent nutrition include:

- Adolescents should be recognised as a priority target group and their needs should be adequately addressed in national programmes.
- Adolescents should be considered separately as two groups for programmatic purpose: 10-14 years and 15-19 years.
- Multisectoral collaboration for adolescent health and nutrition should be led by the health sector.
- Adolescent nutrition should be mainstreamed and integrated in existing public health programmes that have an adolescent component.
- It is important to include adolescent nutrition as an integral component in National Adolescent Health Strategies that are being formulated.
- There should be clear-cut policy and strategies for reaching adolescents in different settings; school going, out-of-school, in urban slums, rural areas etc.
- Gender issues, behaviour/life-style modification using multisectoral approach should be addressed.
- Involving adolescents and young people in the design, planning, implementation and evaluation of measures to improve their health and nutritional status will increase their ownership.

Nutrition interventions for children under 2 years old

Undernutrition was strongly associated, both in the review of published work and in new analyses, with shorter adult height, less schooling, reduced economic productivity, and—for women—lower offspring birth-weight. Damage suffered in early life leads to permanent impairment, and might also affect future generations.

Poor foetal growth or stunting in the first 2 years of life leads to irreversible damage, including shorter adult height, lower attained schooling, reduced adult income, and decreased offspring birth-weight

Children who are undernourished in the first 2 years of life and who put on weight rapidly later in childhood and in adolescence are at high risk of chronic diseases related to nutrition

There is no evidence that rapid weight or length gain in the first 2 years of life increases the risk of chronic disease, even in children with poor foetal growth
The prevention of maternal and child undernutrition is a long-term investment that will benefit the present generation and their children

Indirect beneficiaries of nutrition interventions

The national costs of malnutrition are very high: a vicious intergenerational cycle of poor health, high death rates, poor quality of life, decreased mental capacity and reduced worker productivity.

There is ample evidence that the intergenerational cycle of growth failure could be turned into a virtuous cycle. Birth weight can be rapidly improved, even in populations of short adult women. Improving the diet in quantity and quality can help achieve this. The effects seem to be greater if the mother is reached either during or preferably before the first semester of pregnancy.

2. Nutrition interventions in schools

General

Jukes, M. Drake, L. & Bundy, D. 2008, *School Health, Nutrition and Education for All*. CABI Publishing, UK.

<http://www.schoolsandhealth.org/documents/school%20health%20and%20nutrition%20-%20levelling%20the%20playing%20field.pdf>

This book looks at how improving children's health and nutrition is essential to achieve Education for All. School health and nutrition programmes are a way to apply the simple effectiveness of global health interventions to deliver large gains in education. This book argues that poor health and nutrition are major barriers to education access and achievement among poor communities. The vast number of children living with diseases like malaria, worm infections and iron deficiency anaemia and the substantial impact these diseases have on education, draws attention to school health and nutrition as an issue of great importance. The simple and highly cost effective methods for treating these diseases, through school-based health services, make the issue an urgent education policy priority for all poor countries. School health and nutrition programmes are clearly a quick fix in the efforts towards Education for All.

The diverse experiences of school health and nutrition programming suggest some key elements which are common contributors to success in many programmes:

- **Focus on education outcomes:** Making an explicit link between school health and nutrition programmes and education sector priorities (especially Education for All and gender equity), helps ensure the commitment of the sector to programme support and implementation.
- **Develop a formal, multi-sectoral policy:** Education sector actions in health require the explicit agreement of the health sector. This potential tension can be resolved by setting out sectoral responsibilities at the outset, while failure to enter into dialogue has led, in Africa and Central Asia, to some health sectors resisting teacher delivery of de-worming drugs, despite WHO recommendations.
- **Initiate a process of wide dissemination and consultation:** There are multiple stakeholders, implementers, enablers and gatekeepers and a process of consultation will establish ownership and identify obstacles before they constrain progress.
- **Use the existing infrastructure as much as possible:** Building on existing curriculum opportunities and the network of teachers will accelerate implementation and reduce costs. Programmes which rely on the development of new delivery systems – mobile school health teams, a cadre of school nurses – are expensive and complicated to take to scale.
- **Build the programme around simple, safe and familiar health and nutrition interventions:** Success in rapidly reaching all schools is crucially dependent upon stakeholder acceptance, which is more likely if the interventions are already sanctioned by local and international agencies and are already in common use by the community.
- **Provide primary support from public resources:** There are compelling arguments for public investment in school health and nutrition programmes (contribution to economic growth, high rates of return etc). On the other hand there is evidence of market failure precluding private provision of programmes.
- **Be inclusive and innovative:** Although public resources are crucial for school health and nutrition programmes, contributions from outside the public should not be excluded.

Drake, L. *Et al.* 2002, *School-Age Children: Their Nutrition and Health*. Prepared for the SCN Working Group on Nutrition of School-Age Children

<http://www.schoolsandhealth.org/Documents/School-Age%20Children%20-%20Their%20Nutrition%20and%20Health.pdf>

This paper addresses the most common nutrition and health problems in turn, assessing the extent of the problem; the impact of the condition on overall development, and what programmatic responses can be taken to remedy the problem through the school system. The paper also acknowledges that an estimated 113 million children of school-age are not in school, the majority of these children living in Sub-Saharan Africa and South-East Asia. Poor health and nutrition that differentially affects this population is also discussed.

This report shows that a child's ability to attain her or his potential is directly related to the synergistic effect of good health, good nutrition and appropriate education. The evidence presented in this paper, and elsewhere, demonstrates the positive impact that simple interventions to combat malnutrition and ill health in the school-age population can have on health, nutrition and learning.

In order to operationalise an effective response, education sectors need to develop an infrastructure and policy context for improving the nutrition and health of school children. A major step forward was taken when a framework to Focus Resources on Effective School Health (FRESH) was developed by UNESCO, WHO, UNICEF, Education International and the World Bank and launched at the World Education Forum in Dakar in April 2000. Partners also include WFP, The Partnership for Child Development, and Save the Children US.

The FRESH framework provides the context for effective implementation of access to health and nutrition services within school health programmes. School-based health and nutrition services, such as food for education, micronutrient supplementation and de-worming, are most effective when they are supported by other strategies. These strategies include policies to provide a non-discriminatory safe and secure environment, provision of safe water and sanitation, effective referral to external health service providers and links with the community. The FRESH framework provides this context by positioning access to health and nutrition services among four core components that should be made available together for all schools:

- Health related school policies;
- Safe water and sanitation;
- Skills based health and nutrition education; and
- Access to health and nutrition services.

These core components of the FRESH framework require school-community partnerships as the supporting strategies for the success of school health and nutrition programmes. These include effective partnerships between the health and education sectors, teachers and health workers, schools and community groups and between the pupils and those responsible for implementing school health and nutrition programmes.

Food and Agriculture Organisation of the UN. 2007, Report of the technical meeting of the Asia Pacific network for food and nutrition on school-based nutrition Bangkok, Thailand 17 to 20 July 2007.

<ftp://ftp.fao.org/docrep/fao/010/ai004e/ai004e00.pdf>

This report provides a summary of the presentations and discussions on policies and programmes on school-based nutrition in some countries in Asia. It concludes that good nutrition is fundamental for children's current and future health, as well as their development and learning. The benefits of developing healthy dietary and lifestyle patterns from an early age onwards can positively impact people's nutrition and health throughout their adult lives, and enhance the productivity of individuals and nations. Nutrition education is an important element in an overall strategy aimed at improving food security and preventing all forms of malnutrition. Schools (from pre-school to secondary) are ideal settings for promoting lifelong healthy eating habits and lifestyles.

Most countries in the region implement school health and nutrition programmes, including school feeding, de-worming, vitamin and mineral supplementation, etc. Innovative, creative

and effective school nutrition education programmes exist in some countries in the region. However, these are often small-scale and implemented as pilot projects, focus on children with special needs and prioritise the transfer of knowledge over the promotion of active learning and the creation of appropriate attitudes, life skills and behaviours. Generally, nutrition education is not systematically integrated into school curricula in the region.

In order to build a comprehensive and sustainable school nutrition programme that addresses all forms of malnutrition, it is recommended that countries:

- Consolidate and strengthen ongoing school-based nutrition programmes, aiming at improved nutritional status and learning of school children and creating an appropriate learning environment through nutrition education, school gardening and school meals, nutritional assessment, clean water and sanitation, as well as physical activity education.
- Apply a multi-disciplinary and multi-stakeholder holistic approach to support effective school-based nutrition programmes and policies at national and local levels.
- Promote the active involvement of parents, communities and local government in the development and implementation of school nutrition programmes.
- Advocate for the integration of nutrition education into the school curriculum for all age groups.
- Promote the integration of nutrition training into the course curriculum of teacher's training institutes.
- Review existing teaching/learning materials on school nutrition education and promote the adaptation of available, or the development of new materials in line with local needs and conditions.
- Promote the establishment of school gardens as an integral part of school nutrition programmes.
- Explore opportunities for appropriate public-private partnerships to support health and nutrition education and improvements in the school environment.
- Explore funding opportunities among bilateral and multi-lateral donors and NGOs.
- Encourage countries to work towards making all schools nutrition-friendly with adequate political commitment and funding.
- Ensure that nutrition education in schools always applies the tri-partite curriculum approach (i.e. link nutrition education in the classroom with learning in the school environment, home and community).
- Nutrition education should always employ a wide range of hands-on teaching/learning methods.

Glasauer, P. *Et al.* 2003, Nutrition as an entry point for health-promoting schools: lessons from China. FAO.

<http://www.fao.org/docrep/006/j0243m/j0243m05.htm#ART4>

Schools are ideal settings for nutrition programmes and services, because nutrition and education are closely linked, and because dietary, hygienic and exercise habits that affect nutritional status are formed during the school-age years.

Apart from the immediate effects on nutrition (and health) knowledge, attitudes and practices among all groups addressed by this project, a number of lessons were learned that could benefit schools interested in embarking on a similar project:

- A "health promotion" approach enhances the effectiveness of nutrition education. Although the project did not specifically set out to make a comparison between a narrow (education only) and a comprehensive (promotion) approach, the boosting

effect of an integrated approach (covering not only nutrition education in the classroom, but also involving changes to the school policy and environment, to school-based health and nutrition services, and active outreach to family and community members) became very evident.

- Parents are a key group in nutrition education for students. Given their role as food providers and care givers at home, parents are a particularly important group to address, in addition to the students themselves, when aiming to change the students' eating habits. Parallel efforts to upgrade the parents' knowledge, skills and attitudes related to health and nutrition can largely determine the effectiveness of nutrition education for students.
- Establishing nutrition and health education as a regular element of the school curriculum remains an important objective. During this project, parents were highly interested in receiving information on food, diet and health and were eager to attend training sessions. Yet schools did not have the capacity to meet this demand for increased nutrition information and education. It became apparent that school projects should seek close collaboration with health sector institutions from the outset and that such collaboration could be of mutual benefit. Schools can benefit from such collaboration, for instance through the provision of materials and expertise. Thus the project underlined the importance of complementary action targeted at the whole community.
- “Local action” is possible; backing it up at national level is better. The large number and wide scope of activities, and the enthusiasm with which they were undertaken by the pilot schools, clearly demonstrated that “local action” is possible. Schools, with fairly limited external guidance and technical assistance, were able to plan and implement an impressive array of activities at different levels, involving students, teachers, the entire school, families and the communities.
- Ensuring governmental support will help individual schools to take on similarly comprehensive health-promotion initiatives.
- It is necessary to ensure that the teachers involved are well prepared in terms of both content and instructional methods. Quality teacher training to upgrade their knowledge of nutrition and pedagogical approaches was mentioned by many of the professional project participants as a crucial precondition for effective nutrition education. Governmental provision could also help alleviate the additional time burden that this type of project represents for teachers who already feel overwhelmed by their traditional academic responsibilities.
- Nutrition education needs to be made an element of the regular classroom curriculum. Until this happens, health-related topics can be sidelined too easily where conflicts emerge with traditional academic subjects or other appealing extracurricular activities. Furthermore, high-quality support materials may not be made available to schools unless nutrition and health education is integrated into the regular curriculum.

Sifri, Z. *Et al.* 2003. School health programmes in Burkina Faso: the Helen Keller International experience. FAO.

<http://www.fao.org/docrep/006/j0243m/j0243m08.htm#ART7>

Delivering health programmes through the educational system that already has an infrastructure in many countries is one of the most cost-effective public health strategies. Schools can affect children's health and well-being through the environment they provide and by developing life skills on health and health-related issues such as hygiene. Water and sanitation facilities are fundamental for hygienic behaviours and children's well-being but, in

practice, many schools have extremely limited sanitary conditions. This may contribute to absenteeism and the drop-out rates of girls.

The school health strategy relies on the children's eagerness to learn, as well as the teachers' and families' willingness to be involved. New health and hygiene behaviour learned in school can lead to life-long positive habits. Teachers can function as role models for the children and within the community. Schoolchildren can influence the behaviour of family members and thereby positively influence whole communities.

Several lessons learned from HKI programmes:

- The inclusion of women social workers was an investment that proved to be very successful. Their willingness and courage constitute one of the major assets for the success of projects linking school gardens with community gardening activities. The quality of the services offered by the village social workers was reinforced by their training and close supervision by health and agricultural extension agents. The social workers received recognition for their role in sustaining the project. The network of female village social workers created an opportunity to maximise, through nutrition education, family and individual consumption of all vitamin A-rich foods.
- The availability of water points to cover the increasing water needs generated by gardening activities is essential for the success of such a project. It is therefore recommended that gardening projects be linked with water point development activities. Where water is available, schools and women's groups are excellent entry points for home gardens. Investment in the functional and management capacities of the communities to manage the project and acquire the necessary knowledge and practices is essential to the success of such projects.
- Gardening projects, because their results are both rapid and visible, are very motivating for communities and help improve participation in other development and public health initiatives. Seeds, small equipment, knowledge and technical expertise are all prerequisites that need to be ensured before school-gardening projects start their activities.
- School health projects with a service delivery component need to ensure that permanent mechanisms are established for supplying schools with essential drugs and micronutrients to avoid the possibility of stock-outs or wastage. Negotiating the sustainability strategy with the communities at the onset of the programme also contributes significantly to its success.
- A well thought-out expansion strategy that can be implemented as soon as programmatically possible is also important.
- Teachers and schoolchildren have an essential role in the success of these school health programmes.
- The HKI experiences highlight the value of building partnerships with the government, communities, United Nations agencies, NGOs and with other donors.

Venkatesh, M. & Neeser, K. 2008, Monitoring and Evaluation of School-Based Health and Nutrition Programmes: A Participative Review. Review conducted on behalf of the FRESH partners for the 'FRESH Partners Meeting' held on 8th – 9th of September 2008
<http://www.schoolsandhealth.org/Documents/Monitoring%20and%20Evaluation%20of%20SHN%20programmes%20-%20A%20participative%20Review.pdf>

Over the past two decades, many governments and organisations have renewed efforts to develop more effective school-based health and nutrition programmes in low income countries. In large part, this has resulted from the growing body of evidence linking children's health and education; and the impact of school health and nutrition (SHN) programmes on improving these outcomes and contributing to Education for All (EFA) and the Millennium Development Goals (MDGs).

The period since 2000 has witnessed a dramatic increase in countries adopting SHN policies and organisations implementing comprehensive SHN programmes. Effective monitoring and evaluation (M&E) is considered essential if comprehensive SHN programmes are to be scaled up and sustained. Many resources have been developed by organisations to assist the M&E of SHN programmes in low income countries. The diversity of M&E resources that exists reflects the fact that SHN programmes are contextual and no one-size-fits-all. Increasingly, however, stakeholders have wondered whether a generic M&E framework, adaptable to the local settings of different programmes, would synergise existing resources and avoid duplication that exists between different guidelines.

This review investigates the international consensus on the development and dissemination of a generic M&E framework for SHN programmes in low income countries. The Partnership for Child Development and Save the Children USA with the participation of the FRESH partners and a range of key informants representing: governments; United Nations agencies; international non-governmental organisations/non-governmental organisations and academic institutes, undertook this review to determine whether or not there is a need for a generic M&E framework; as well as identify good practices and limitations in existing resources.

The aim of this review is to form a starting point for discussions on how to develop and disseminate a future generic M&E framework. Such discussions are expected to be initiated at a meeting with the concerned 24 organisations to be held at the headquarters of the World Health Organisation in Geneva in September 2008.

The key findings of the review were:

- There is a strong demand for a generic M&E framework for SHN programmes, which is supported and recognised by different partners, especially national governments and stakeholders. Such a framework should be provided as a hard copy resource kit and through face-to-face training.
- Common health, education, and nutritional outcomes and programmatic processes based on the 'FRESH core activities' should form the basis of a generic M&E framework.
- Common minimum standards for SHN programmatic processes are required so that standardised guidance is provided to organisations and so that comparability of programmes is increased. Guidance for particular contexts should be provided in specific modules of the framework.
- Core indicators for SHN programmes are required. Those indicators that are already internationally agreed upon and reported by ongoing tools are strong candidates for ensuring that the generic M&E framework for SHN programmes complements and fits within existing structures for data management.

World Health Organisation. 2008, Global Strategy on Diet, Physical Activity and Health -School Policy Framework. WHO, Geneva

<http://www.who.int/dietphysicalactivity/schools/en/index.html>

The purpose of this tool is to guide policy-makers at national and sub-national levels in the development and implementation of policies that promote healthy eating and physical activity in the school setting through changes in environment, behaviour and education.

World Health Organisation. 2003, Creating an Environment for Emotional and Social Well-Being Information series on school health Document 10. WHO, Geneva

http://www.who.int/school_youth_health/media/en/sch_childfriendly_03_v2.pdf

This is a tool to help shape a healthy, safe and friendly environment for all who live, learn and work in schools. It is designed to help school personnel assess qualities of the school environment that support social and emotional well-being. It is intended to be a starting point,

leading to awareness, discussion, and action by school personnel, students and parents. It will help them recognise and sustain those aspects of the school environment that support social and emotional well-being and improve those aspects that do not. It also will help school personnel consider ways to support positive changes in the school environment with school health policies, skills based health education and school health services -- core components of an effective school health programme as called for in the joint international initiative to Focus Resources for Effective School Health (FRESH).

Muehlhoff, E. *Et al.* 2005, Can nutrition education make a difference? Paper presented at the 18th International Congress on Nutrition Durban, South Africa, 19-23 September 2005

ftp://ftp.fao.org/ag/agn/nutrition/muehlhoff_fao.pdf

This presentation seeks to answer the question, whether nutrition and health education in schools can contribute directly to improving the health of school-age children, and hence, in the long term, the health of the population as a whole. The findings suggest that yes; nutrition education can make a difference, within certain limits. However, findings from the field-testing were small-scale, impressionistic and partial. A wider and more systematic evaluation is needed.

Micronutrients

Best, C., Neufingerl, N., Del Rosso, J. M., Transler, C., van den Briel, T., & Osendarp, S. 2011, Can multi-micronutrient food fortification improve the micronutrient status, growth, health, and cognition of schoolchildren? A systematic review. *Nutrition Reviews*, 69, 186-204

<http://www.ncbi.nlm.nih.gov/pubmed/21457264>

Micronutrient deficiencies compromise the health and development of many school-age children worldwide. Previous research suggests that micronutrient interventions might benefit the health and development of school-age children and that multiple micronutrients might be more effective than single micronutrients. Fortification of food is a practical way to provide extra micronutrients to children. Earlier reviews of multiple micronutrient (MMN) interventions in school-age children did not distinguish between supplementation or fortification studies. The present review includes studies that tested the impact of multiple micronutrients provided via fortification on the micronutrient status, growth, health, and cognitive development of schoolchildren. Twelve eligible studies were identified. Eleven of them tested the effects of multiple micronutrients provided via fortified food compared to unfortified food. One study compared fortification with multiple micronutrients to fortification with iodine alone. Multi-micronutrient food fortification consistently improved micronutrient status and reduced anaemia prevalence. Some studies reported positive effects on morbidity, growth, and cognitive outcomes, but the overall effects on these outcomes were equivocal.

The findings of this review show that MMN food fortification can improve micronutrient status and reduce anaemia in schoolchildren. Considering the vast number of school-age children suffering from MMN deficiencies and the consequences, the overall impact of MMN interventions in school-age children can be an investment in future generations by helping these children to achieve optimal health and increase their potential to learn.

Future research should test the efficacy of MMN-fortified-food-based interventions in a two-by-two design (testing MMN fortification of food against an unfortified food, a MMN tablet, and no intervention at all) in order to be able to assess the separate effects of energy and macronutrients versus MMNs as well as their interactions. Researchers should consider comparing the cost effectiveness of providing MMN-fortified foods to that of micronutrient supplements through schools in future studies.

Berry, J., Mukherjee, P. & Shastry, G. (2012) *Taken with a grain of salt? Micronutrient fortification in South Asia*, CESifo Economic Studies
<http://cesifo.oxfordjournals.org/content/early/2012/05/04/cesifo.ifs011.full>

This paper reviews the research on fortification of food in the context of South Asia, with an emphasis on avenues for future research in economics and policy. One important knowledge gap is how to distribute fortified products in a way that enables malnourished households to consume sufficient quantities.

School-based distribution is commonly used in the existing evaluations of micronutrient fortification. One reason for this is that school-age children are important beneficiaries to target: they are undergoing substantial physical and mental development and therefore have nutritional demands beyond those of other populations. A second reason that nutrition is often provided in school is to create additional incentives for children to attend school, and thereby reduce the net costs of schooling for parents. While this might be effective when a full meal is provided, it is not obvious that fortifying an existing meal would increase the incentive, unless it is combined with programmes to improve awareness of micronutrient deficiencies. Another advantage of school-based distribution is that, for some countries, the school system is the most comprehensive infrastructure available through which to reach children in remote areas. Even before there is political support for a more general mandate, governments can promote the use of fortified ingredients through schools.

The disadvantages of school-based distribution are the flip side of these benefits. There are important target groups not reached through schools. For example, there is evidence that children younger than school age are more likely to benefit from nutrition programmes (Adelman, Gilligan, and Lehrer, 2008). In India, 70% of children under the age of five and 56% of ever-married women age 15-49 are anaemic, making reaching these at-risk groups imperative.

There is also a lack of evidence supporting the association between school-based fortification programmes and cognitive development for school-age children or learning in school, whereas there is more conclusive evidence that iron supplementation of infants and preschool children can prevent the cognitive impairment that results from iron deficiency anaemia, although the long term impacts are unknown. It is certainly possible that providing nutrition to children in school relaxes the household's budget constraint, resulting in more nutrients for younger children and pregnant women. While there is some evidence of such positive spill overs, there is also evidence that parents do not substitute food away from children who receive a lunch in school. In addition, reaching children currently not in school could also improve enrolment in school as the health of children out of school improves.

Despite the improvement in access to schools, there is substantial anecdotal evidence, particularly in South Asia, that the quality of the meals provided in school varies considerably, partly due to limited resources, inadequate infrastructure and widespread inefficiency and corruption. Currently, there is little evidence on whether and how the quality and nutritional content of these meals can be improved. Some possible strategies to improve these meals include better training for meal providers, a more direct mandate or incentives to include fortified ingredients and increased monitoring.

Christian, P. & Tielsch, J. 2011, Evidence for Multiple Micronutrient Effects Based on Randomized Controlled Trials and Meta-Analyses in Developing Countries. *Journal of Nutrition* 142 (1)
<http://www.ncbi.nlm.nih.gov/pubmed/22157540>

Providing multiple micronutrients via supplements, powders, or fortified ready-to-use foods is increasingly becoming a strategy for simultaneously addressing multiple nutrient deficiencies in developing countries. Over the past decade, numerous RCT have been undertaken to test

the efficacy of multiple micronutrient supplementation in both pregnant women and young children. Outcomes of interest have ranged from birth weight to child growth, and infant morbidity and mortality to nutrient status and cognitive function. These RCT have also been submitted to meta-analyses for estimating pooled effect sizes for various outcomes. Meta-analyses of antenatal multiple micronutrient supplementation reveal a modest but significant increase in birth weight of 22.4 g (95%CI: 8.3, 36.4 g) and an 11% (95% CI: 3, 19) reduction in low birth weight but no impact on preterm birth or perinatal mortality. In children, small effect sizes of 0.13 (95% CI: 0.06, 0.21) for length/height and 0.14 (95% CI: 0.03, 0.25) for weight have been shown with 3 or more micronutrients compared to fewer micronutrients, but there is limited evidence for an impact on outcomes such as morbidity and cognitive function.

School feeding (including Home Grown School Feeding – HGSF)

Kazianga, H., de Walque, D., & Alderman, H. 2009. Educational and health impacts of two school feeding schemes: evidence from a randomized trial in rural Burkina Faso No 4976. *Policy Research Paper Series.*

http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2009/07/15/000158349_20090715163511/Rendered/PDF/WPS4976.pdf

This paper uses a prospective randomised trial to assess the impact of two school feeding schemes on health and education outcomes for children from low-income households in northern rural Burkina Faso. The two school feeding programmes under consideration are, on the one hand, school meals where students are provided with lunch each school day, and, on the other hand, take-home rations that provide girls with 10 kg of cereal flour each month, conditional on 90 percent attendance rate. After running for one academic year, both programmes increased girls' enrolment by 5 to 6 percentage points. While there was no observable significant impact on raw scores in mathematics, the time-adjusted scores in mathematics improved slightly for girls. The interventions caused absenteeism to increase in households that were low in child labour supply while absenteeism decreased for households that had a relatively large child labour supply, consistent with the labour constraints. Finally, for younger siblings of beneficiaries, aged between 12 and 60 months, take-home rations have increased weight-for-age by 0.38 standard deviations and weight-for-height by 0.33 standard deviations. In contrast, school meals did not have any significant impact on the nutrition of younger children.

Michtell, A. 2003, School feeding: now more than ever. FAO.

<http://www.fao.org/docrep/006/j0243m/j0243m02.htm#ART1>

This article argues that food-assisted education works. In-school feeding and “take-home rations” (food to take home to their families given to students who achieve attendance standards) result in higher enrolment and attendance rates, lower drop-out rates and improved student performance. Other education-supportive uses of food aid include food-for-work for school, storage, latrine or well construction; food support for key school helpers; teacher training; and literacy and skills training for adults in the community.

School feeding provides an entry point for other interventions. The food acts as an incentive and catalyst for other things to happen. First, recipient communities tend to organise themselves to manage the food: its storage, preparation and use. This appears to be true even for “new” communities, or those with little or no prior organisation or management experience. Community involvement contributes to programme management, complementary activities, and, in the long term, programme sustainability.

The food also acts as a leverage and catalyst for other partners. WFP's main partner in each country is the national government. Generally speaking, the government is involved in school-feeding activities at the national, regional and local levels. Normally, the government

takes charge of the transport, handling and storage from WFP's "extended delivery point" within a country, at least, and in many cases it plays a much broader role. In several countries, WFP's assistance accounts for only a small portion of a national school-feeding programme managed by the government. This strong commitment on the part of national governments was evidenced in a recent set of studies by WFP of countries where it had supported school feeding in the past, but had now phased out its support. In each of the six countries visited (Botswana, Brazil, Jamaica, Namibia, Paraguay and Swaziland), school-feeding activities were continuing, several years after WFP's departure.

In addition to strengthening community and government relationships, other international and local organisations can be mobilised to ensure a full range of complementary activities, such as de-worming, micronutrient fortification, clean water, latrines, health and nutrition education, and educational inputs.

Bundy, D. *Et al.* 2009. Rethinking school feeding. WFP/World Bank, USA.

<http://www.schoolsandhealth.org/documents/rethinking%20school%20feeding.pdf>

The objective of this review is to provide guidance on how to develop and implement effective school feeding programmes, in the context of both a productive safety net, as part of the response to the social shocks of the current global crises, as well as a fiscally sustainable investment in human capital as part of long-term global efforts to achieve Education for All and provide social protection for the poor.

School feeding programmes provide an explicit or implicit transfer to households of the value of the food distributed. The programmes are relatively easy to scale up in a crisis and can provide a benefit per household of more than 10 percent of household expenditures, even more in the case of take-home rations. In many contexts, well-designed school feeding programmes can be targeted moderately accurately, though rarely so effectively as the most progressive of cash transfers. In the poorest countries, where school enrolment is low, school feeding may not reach the poorest people, but in these settings alternative safety net options are often quite limited, and geographically targeted expansion of school feeding may still provide the best option for rapid scale-up of safety nets. Targeted take-home rations may provide somewhat more progressive outcomes. Further research is required to assess the longer-term relative merits of school feeding versus other social safety net instruments in these situations.

There is evidence that school feeding programmes increase school attendance, cognition, and educational achievement, particularly if supported by complementary actions such as de-worming and micronutrient fortification or supplementation. In many cases the programmes have a strong gender dimension, especially where they target girls' education, and may also be used to benefit specifically the poorest and most vulnerable children. What is less clear is the relative scale of the benefit with the different school feeding modalities, and there is a notable lack of engagement of educators on research around these issues. The clear education benefits of the programmes are a strong justification for the education sector to own and implement the programmes, while these same education outcomes contribute to the incentive compatibility of the programmes for social protection. Policy analysis also shows that the effectiveness and sustainability of school feeding programmes is dependent upon embedding the programmes within education sector policy. Hence, the value of school feeding as a safety net and the motivation of the education sector to implement the programmes are both enhanced by the extent to which there are education benefits.

Well-designed school feeding programmes, which include micronutrient fortification and de-worming, can provide nutritional benefits and should complement and not compete with nutrition programmes for younger children, which remain a clear priority for targeting malnutrition overall.

Jacoby, H. G. 2002, Is there an intrahousehold flypaper effect? Evidence from a school feeding programme. *Economic Journal*, 112 (476), 196-221
<http://onlinelibrary.wiley.com/doi/10.1111/1468-0297.0j679/pdf>

This paper studies the impact of a school feeding programme on child caloric intake in the Philippines using a quasi-experimental methodology. It seeks to address whether public transfers targeted toward children are neutralised by the household, as the theory of altruism implies, or is there an intrahousehold 'flypaper effect' whereby such transfers 'stick' to the child. The empirical results confirm an intrahousehold flypaper effect; indeed, they indicate virtually no intrahousehold reallocation of calories in response to the feeding programme. In poorer households, however, children's gains from the programme appear to be 'taxed' more heavily.

Afridi, F. 2010, Child welfare programmes and child nutrition: Evidence from a mandated school meal programme in India. *Journal of Development Economics*, 92(2), 152-165.
<http://www.sciencedirect.com/science/article/pii/S0304387809000169>

This paper focuses on school meals, nutrition and intra-household allocation. Data from a nationally mandated school meal programme in India was examined to discover the extent to which children benefit from the targeted public transfer. Relying upon built-in randomness in whether a child's 24-hour food consumption recall was for a school or non-school day, it was found that the daily nutrient intake of programme participants increased substantially by 49% to 100% of the transfers. The results are robust to the potential endogeneity of programme placement and individual participation. The findings suggest that for as low a cost as 3 cents per child per school day the scheme reduced the daily protein deficiency of a primary school student by 100%, the calorie deficiency by almost 30% and the daily iron deficiency by nearly 10%. At least in the short-run, therefore, the programme had a substantial effect on reducing hunger at school and protein–energy malnutrition.

WFP 2007, Home-Grown School feeding field case study: Ghana. WFP
<http://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp207421.pdf>

Home-grown school feeding (HGSF) combines quality local agricultural production and traditional school feeding. It is based on the premise that low farm productivity, poor agricultural market development and poor educational and nutritional outcomes are mutually reinforcing and jointly determine key aspects of rural hunger and poverty. HGSF is a relatively new concept that has been implemented only in a few countries and has yet to be fully developed. This paper details the World Food Programme's (WFPs) Ghana School Feeding Programme (GSFP) case study. Ghana was selected due of its long history of school feeding programmes.

Primary and secondary data were collected. The secondary data collection included an extensive review of literature and other documentation and extensive in-depth interviews with key stakeholders using a prepared checklist. The Northern and Greater Accra Regions were chosen for the case study and a field trip was organised in the two regions to collect primary data.

The GSFP involves providing one hot and nutritionally balanced meal for school children on site for US\$0.32 per child per day, using locally produced and procured food items. Additional activities complementary to food interventions are also part of the package. These include de-worming, provision of water and sanitation, micronutrient supplementation, health and hygiene education, HIV/AIDS prevention, creation of school gardens and malaria prevention.

There are several areas in which the GSFP has the potential to make a significant contribution toward educational and agricultural policy goals within Ghana. School feeding is

identified as one strategy in the Ministry's Annual Education Sector Operational Plan (2007-2009) to help government achieve 100 percent completion rates for male and female children at all basic levels of education by 2015. The GSFP is therefore receiving attention at the highest policy level. The use of locally produced food for the GSFP is also meant to provide markets for local farmers, enhance local farmers' productivity and production and improve their incomes, in line with the government's policy of reducing poverty. Generally, however, the GSFP has failed to make any significant positive impacts on agricultural production in the beneficiary communities. The Farmer Based Organisation (FBO) concept must be considered for GSFP implementation since there appears to be no strategy in the GSFP to link farmers and farmer organisations to the programme. Two advantages can be derived from such a linkage: it can bring school feeding costs down and can create market opportunities for local farmer organisations and their members, thereby enhancing their production and incomes, in line with the programme objective.

There is enough evidence from other SFPs reviewed in the present study that community involvement promotes community ownership and this is key to successful and sustainable school feeding operations.

The case study work revealed that the GSFP has achieved some successes during its relatively short period of implementation. The immediate impact has increased school enrolment, attendance and retention across GSFP schools. During the GSFP pilot phase, school enrolment increased by almost 21 percent within the first five months. In the schools covered for this case study, the percentage increases were even higher.

Other immediate and positive impacts include the reduction in hunger and malnutrition among beneficiary school children. Children in beneficiary schools appear physically healthy. School authorities in Kpalgun Zion School, for example, intimated that morbidity among the school children had gone down considerably since the introduction of the school feeding programme in their school. Some children were arriving at school and then becoming ill on arrival; this has stopped with the introduction of the GSFP. Parents interviewed also indicated that their children do not eat breakfast at home since the programme began in their community because there is assurance of a hot meal at school. This new development is an unintended impact of the programme since children are supposed to eat three square meals a day. It appears the parents are substituting breakfast at home with the lunch provided in school. The case study research indicated that without more education and programmes to create awareness to accompany the GSFP interventions, there is a potential for a decline in parental responsibility to feed their children.

Another impact of the programme which must be carefully considered is the potential negative effect of increasing enrolments in schools that are not prepared and have not planned for the large numbers of children. As indicated earlier, teachers in beneficiary schools now have to handle larger classes and this is affecting effective supervision and quality teaching because the expansion in numbers is not being matched by an expansion in academic facilities.

In addition to the immediate objectives of the programme, there are long-term objectives that mainly address issues of malnutrition, hunger and poverty. In the long term, addressing these problems will depend on policy interventions related to improving household food security and incomes.

The programme has a number of challenges that must be addressed in order to enable it to achieve its full potential:

- 1) The decentralised procurement system proposed for the programme has been bypassed. Instead, suppliers and caterers are being used for procurement, with no input from the schools and communities about how the funds are utilised. As a result, the objective of ensuring that school feeding programme partners buy from local

- farmers to promote increased food production is not being achieved. Buying from local farmers for the school feeding programme is more cost effective and encourages increased food production.
- 2) The governance aspect of the programme is weak. The GSFP structures, from the Ministerial Oversight Committee at the national level to the School Implementation Committee at the local level, are not functioning. This has had a negative effect on the management of the programme. Poor monitoring and evaluation of the programme must improve if the programme is to ensure transparency and accountability. Health surveys also need to be conducted to determine the level of health and nutritional improvement among the beneficiary children.
 - 3) The GSFP funding mechanism must improve in order to reduce bureaucracy and delays in disbursement which have a negative impact on programme implementation.

There are a number of areas in which WFP can assist the GSFP to improve the quality and scale of its programme, particularly in developing a more school-based approach and ensuring that the nutritional aspects of its programme are achieved. The basic WFP ration has been tested with the GSFP menus and adds significant nutritional value. Additionally, WFP has been providing support to the private sector to produce and market the national fortified food delivery chains of iodized salt, palm oil and fortified corn-soy blend and maize meal. The WFP-initiated private partnerships have helped build national recognition of the need for increased production and distribution of iodized salt and have proven that fortification can be taken up by the private sector if strategic interventions are made. These private-public partnerships should continue to be pursued by GSFP.

Espejo, F. *Et al.* Circa 2009. Home-Grown School Feeding - a framework to link school feeding with local agricultural production, World Food Programme
<http://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp204291.pdf>

Home-grown school feeding (HGSF) is a school feeding programme that offers food produced and purchased within a country. WFP's HGSF particular focus is to produce and purchase food for the school feeding programme from local small-scale farmers. From WFP's perspective, an HGSF programme aims to both increase children's well-being and promote local agricultural production and development by providing an ongoing market for small landholders ("smallholders").

The value of HGSF programmes has been recognised consistently by many governments and organisations. HGSF has the potential to have an immediate impact on food insecurity in Africa with the potential to contribute to long-term development goals. The United Nations 2005 World Summit recommended "the expansion of local school meal programmes, using home-grown foods where possible" as one of the "quick impact initiatives" to achieve the Millennium Development Goals, especially for rural areas facing the dual challenge of high chronic malnutrition and low agricultural productivity. There is a broad understanding that HGSF programmes can deliver a wide variety of outcomes. It is assumed that they have the potential to trigger development processes that benefit not only children in schools, but the community as a whole. But what needs to be done to make this happen? How can school feeding programmes become true development tools at the community and country levels? This framework seeks to respond to these questions by providing information to government and implementing partner staff about how to use existing school feeding programmes as a platform to stimulate local agricultural production and local development. The document aims to highlight best practices based on current experiences with this type of approach, identify key success factors and possible risks of an HGSF programme and provide a step-by-step framework for design and implementation.

This guide serves to provide information on important issues that need to be addressed when implementing HGSF, including:

- Assuring minimum nutritional standards are maintained

- Maintaining a continuous supply of food to schools
- Ensuring food quality and safety:
- Countering corruption and bureaucratic inefficiency
- Reducing costs of procurement from small-scale farmers
- Preventing price increases
- Protecting farmers' own food stocks
- Protecting crop diversity:
- Avoiding increasing the community's work load:
- Avoiding distracting teachers from other responsibilities
- Transporting food to food-insecure areas
- Facilitating institutional coordination
- Balancing costs and benefits

Kristjansson, B., Petticrew, M., MacDonald, B., Krusevec, J., Janzen, L., Greenhalgh, T., Wells, G. A., MacGowan, J., Farmer, A. P., Shea, B., Mayhew, A., Tugwell, P., Welch, V. 2007, School feeding for improving the physical and psychosocial health of disadvantaged students. *Cochrane Database of Systematic Reviews Issue 1.*
<http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004676.pub2/pdf>

Early malnutrition and/or micronutrient deficiencies can adversely affect physical, mental, and social aspects of child health. School feeding programmes are designed to improve attendance, achievement, growth, and other health outcomes. The main objective of this review was to determine the effectiveness of school feeding programmes in improving physical and psychosocial health for disadvantaged school pupils.

A number of databases as well as grey literature sources were searched. Reference lists of included studies and key journals were hand searched and we also contacted selected experts in the field. Data from randomised controlled trials (RCTs), non-randomised controlled clinical trials (CCTs), controlled before and after studies (CBAs), and interrupted time series studies (ITs) were included. Feeding had to be done in school; the majority of participants had to be socio-economically disadvantaged. A total of 18 studies met the criteria and were included.

The review concluded that school meals may have some small benefits for disadvantaged children. However further well-designed studies on the effectiveness of school meals need to be undertaken and results should be reported according to socio-economic status. It is recommended that researchers gather robust data on both processes and carefully chosen outcomes.

In the highest quality studies (randomised controlled trials (RCTs) from low income countries, children who were fed at school gained an average of 0.39 kg more than controls over 19 months; in lower quality studies (controlled before and after trials (CBAs)), the difference in gain was 0.71 kg over 11.3 months. Children who were fed at school attended school more frequently than those in control groups; this finding translated to an average increase of 4 to 6 days a year per child. For educational and cognitive outcomes, children who were fed at school gained more than controls on math achievement, and on some short-term cognitive tasks. Results from higher income countries were mixed, but generally positive. For height, results from lower income countries were mixed; in RCTs, differences in gains were important only for younger children, but results from the CBAs were large and significant overall. Results for height from high Income countries were mixed, but generally positive. School meals may have small physical and psychosocial benefits for disadvantaged pupils.

Chettiparambil-Rajan, A. 2007, India: A desk review of the Mid-Day Meals Programme, World Food Programme.
<http://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp207424.pdf>

The mid-day meal (MDM) programme is a multi-faceted programme of the Government of India that, among other things, seeks to address issues of food security, lack of nutrition and access to education on a nationwide scale. The first venture in mid-day meals was in 1925 and it continues today, although in a different format. The national programme of nutritional support to primary education was revised in 2004 and includes:

- Cooking costs at US\$0.02 per child per school day;
- Transport subsidies, which were raised from the earlier maximum of US\$1.24 per quintal to US\$2.49 per quintal for special category states and US\$1.87 per quintal for other states;
- Management, monitoring and evaluation costs at 2 percent of the cost of food grains, transport subsidies and cooking assistance;
- Provision of mid-day meals during summer vacation in drought-affected areas.

Benefits of having a mid-day meal programme were clear, yet there were serious shortcomings in the implementation of the programme. The key points that filter through an examination of the Indian MDM programme can be grouped into three categories:

1. Macroeconomic issues and the Public Distribution System (PDS);
2. Issues of health, education and poverty;
3. Issues of management and information.

Macroeconomic considerations and the PDS:

- Ground-level implementation of the programme results from many levels of policy (i.e. national, state, district, block and local governments and the schools).
- Food grains are off-loaded from the central PDS, which plays a wider role in the economy. The MDM programme complements this wider role in two ways – by cutting costs of the PDS and improving food security.
- The MDM programme cuts costs by:
 - Improving the purchasing power of families, which in turn could lead to more food consumption creating greater demand and deterring increases of surplus;
 - Allowing the dissemination of excess food stocks to targeted populations, which deters the potential increase of excess stock;
 - Helping to keep prices stable due to the increased demand, which decreases the magnitude and need for price support mechanisms for procurement and therefore reduces the costs of the overall food subsidy;
 - Decentralising storage by storing food grains in locations closer to the MDM programme, thus reducing storage costs;
 - Increasing overall demand and price stability which can lead to a producer surplus.
- In terms of food security, the greater demand stimulated by the MDM programme extends the coverage both in terms of the number of meals a family can afford and in terms of reaching hitherto excluded populations which decreases the gap between demand surplus and actual surplus in food.

Health, education and poverty:

- The overall effect of the MDM programme on school attendance and retention is positive. However, there is a class bias with lower classes valuing and benefiting from the scheme more.
- The MDM programme can, in certain places, displace the primary function of the schools (i.e. education), reducing them to benefit distribution centres.

- The effect on nutrition is ambiguous and depends upon both the quantity and quality of the meal. If the quantity of food is small, the meal becomes more of a supplement than a substitute. Qualitatively, if the MDM programme is not supplemented by other factors, such as a clean water supply and environmental hygiene, nutritional effects are unlikely.
- A large potential exists for introducing nutrition supplements to excluded populations.
- The target population for the MDM programme can be widened to include other hard-to-reach populations.
- Barriers to mixing castes and classes can temporarily dissolve in the context of the MDM programme.

Management and information:

- The management of the MDM programme leaves much to be desired. The main constraints for improvement are:
 - Lack of available funds;
 - Lack of funds to develop infrastructure
 - Lack of parental involvement and bottom-up monitoring mechanisms;
 - Potential for corruption.
- The MDM programme could benefit from better education and awareness among parents and teachers.

World Food Programme. 2007, Guidelines for targeting of food for education programmes. World Food Programme. WFP School Feeding Service.

<http://www.schoolsandhealth.org/Documents/Guidelines%20for%20targeting%20of%20Food%20For%20Education%20Programmes.pdf>

This document provides details and guidelines on the WFPs food for education programme.

De-worming

WHO. 2003, School de-worming: at a glance. WHO, Geneva

http://www.who.int/wormcontrol/documents/en/at_a_glance.pdf

All the common worm infections in school-age children can be treated effectively with two single dose pills: one for all the common intestinal worms (hookworms, roundworms, and whipworms) and the other for schistosomiasis (bilharzia). The treatment is safe, even when given to uninfected children.

School-age children typically have the highest intensity of worm infection of any age group. In addition, the most cost-effective way to deliver de-worming pills regularly to children is through schools because schools offer a readily available, extensive and sustained infrastructure with a skilled workforce that is in close contact with the community. With support from the local health system, teachers can deliver the drugs safely. Teachers need only a few hours training to understand the rationale for de-worming, and to learn how to give out the pills and keep a record of their distribution. Regular de-worming contributes to good health and nutrition for children of school age, which in turn leads to increased enrolment and attendance, reduced class repetition, and increased educational attainment. The most disadvantaged children – such as girls and the poor – often suffer most from ill health and malnutrition, and gain the most benefit from de-worming.

School-based de-worming has its full impact when delivered within an integrated school health programme that includes the following key elements of the FRESH (Focus Resources on Effective School Health) framework:

- 1) Health policies in schools that advocate the role of teachers in health promotion and delivery;
- 2) Adequate sanitation and access to safe water to reduce worm transmission in the school environment;
- 3) Skills-based health education that promotes good hygiene to avoid worm infection;
- 4) Basic health and nutrition services that include regular de-worming.

3. Nutrition interventions for school age children

Improved hygiene

Clasen, T.F., Bostoen, K., Schmidt, W.P., Boisson, S., Fung, I.C.H., Jenkins, M.W., Scott, B., Sugden, S. & Cairncross, S. (2010) Interventions to improve disposal of human excreta for preventing diarrhoea, Cochrane Database of Systematic Reviews, Issue 6

<http://www.thecochranelibrary.com/userfiles/ccoch/file/Water%20safety/CD007180.pdf>

Diarrhoeal diseases are a leading cause of mortality and morbidity, especially among young children in low-income countries, and are associated with exposure to human excreta. This review assesses the effectiveness of interventions to improve the disposal of human excreta for preventing diarrhoeal diseases. Thirteen studies from six countries covering over 33,400 children and adults in rural, urban, and school settings met the review's inclusion criteria. In all studies the intervention was allocated at the community level. While the studies reported a wide range of effects, 11 of the 13 studies found the intervention was protective against diarrhoea. Differences in study populations and settings, in baseline sanitation levels, water, and hygiene practices, in types of interventions, study methodologies, compliance and coverage levels, and in case definitions and outcome surveillance limit the comparability of results of the studies included in this review.

This review provides some evidence that interventions to improve excreta disposal are effective in preventing diarrhoeal disease. However, this conclusion is based primarily on the consistency of the evidence of beneficial effects. The quality of the evidence is generally poor and does not allow for quantification of any such effect. The wide range of estimates of the effects of the intervention may be due to clinical and methodological heterogeneity among the studies, as well as to other important differences, including exposure levels, types of interventions, and different degrees of observer and respondent bias. Rigorous studies in multiple settings are needed to clarify the potential effectiveness of excreta disposal on diarrhoea. Further research, including randomised controlled trials, is necessary to understand the full impact of these interventions.

Ejemot-Nwadiaro, R., Ehiri, J., Meremikwu M. & Critchley, J. 2008, Hand washing for preventing diarrhoea. Cochrane Database of Systematic Reviews, Issue 1.

<http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD004265.pub2/pdf>

Diarrhoea is a common cause of morbidity and a leading cause of death among children aged less than five years, particularly in low- and middle-income countries. It is transmitted by ingesting contaminated food or drink, by direct person-to-person contact, or from contaminated hands. Hand washing is one of a range of hygiene promotion interventions that can interrupt the transmission of diarrhoea-causing pathogens. This review evaluates the effects of interventions to promote hand washing on diarrhoeal episodes in children and adults.

Interventions that promote hand washing can reduce diarrhoea episodes by about one-third. This significant reduction is comparable to the effect of providing clean water in low-income

areas. However, trials with longer follow up and that test different methods of promoting hand washing are needed.

Humphrey, J. 2009, Child undernutrition, tropical enteropathy, toilets, and hand washing, Lancet 374: 1032–35

<http://d.yimg.com/kq/groups/13947767/662678642/name/Lancet+Zwitambo.pdf>

This report suggests: that a key cause of child undernutrition is a subclinical disorder of the small intestine known as tropical enteropathy caused by faecal bacteria ingested in large quantities by young children living in conditions of poor sanitation and hygiene. Provision of toilets and promotion of hand washing after faecal contact could reduce or prevent tropical enteropathy and its adverse effects on growth; and that the primary causal pathway from poor sanitation and hygiene to undernutrition is tropical enteropathy and not diarrhoea. Safe disposal of stools (i.e., toilets) and hand washing with soap after faecal contact are the primary barriers to faecal-oral transmission because they prevent faeces from entering the domestic environment.

The complex problem of child undernutrition will not be solved with toilets and hand washing alone. Interventions focused on gut microbial populations and improved drinking water quality might be important, together with continued efforts to improve infant diets. This paper hypothesises that prevention of tropical enteropathy, which afflicts almost all children in the developing world, will be crucial to normalise child growth, and that this will not be possible without provision of toilets. Randomised controlled trials of toilet provision and hand washing promotion that include tropical enteropathy and child growth as outcomes will give valuable evidence for this premise, and might offer a solution.

Cash transfers

Arnold, C., Conway, T. & Greenslade, M. (2011) DFID cash transfers literature review, Policy Division, DFID, London, UK

<http://www.dfid.gov.uk/r4d/PDF/Articles/cash-transfers-literature-review.pdf>

This paper provides a synthesis of current global evidence on the impact of cash transfers in developing countries, and of what works in different contexts, or for different development objectives. Modest but regular income from cash transfers helps households to smooth consumption and sustain spending on food, schooling and healthcare in lean periods without the need to sell assets or take on debt. Households receiving transfers spend more on food, resulting in significant gains in children's weight and height in several countries.

Lagarde, M., Haines, A. & Palmer, N. 2009, The impact of conditional cash transfers on health outcomes and use of health services in low and middle income countries. Cochrane Database of Systematic Reviews, Issue 4.

<http://apps.who.int/rhl/reviews/CD008137.pdf>

Conditional cash transfers (CCT) provide monetary transfers to households on the condition that they comply with some pre-defined requirements. CCT programmes have been justified on the grounds that demand-side subsidies are necessary to address inequities in access to health and social services for poor people. In the past decade they have become increasingly popular, particularly in middle income countries in Latin America.

Conditional cash transfer programmes have been the subject of some well-designed evaluations, which strongly suggest that they could be an effective approach to improving access to preventive services. Their replicability under different conditions - particularly in more deprived settings - is still unclear because they depend on effective primary health care and mechanisms to disburse payments. Further rigorous evaluative research is needed,

particularly where CCTs are being introduced in low income countries, for example in Sub-Saharan Africa or South Asia.

A total of 29 papers were found on the impact of conditional cash transfers (CCT) on access to care and health outcomes. Of these, ten papers, reporting results from six studies, satisfied the inclusion criteria; four of these studies were randomised experiments. Despite a number of methodological weaknesses in some studies, overall the research evidence suggests that CCT schemes may result in a number of benefits to health for poor populations. Many conditional cash transfer programmes include a number of components, including incentivising attendance for health education, measurements of height and weight, immunisations and nutritional supplementation. Conditional cash transfer programmes appear to be an effective way to increase the uptake of preventive services and encourage some preventive behaviours. In some cases programmes have noted improvement of health outcomes, though it is unclear to which components this positive effect should be attributed.

Fiszbein, A. & Schady, N. 2009 Conditional cash transfers – reducing present and future poverty, the World Bank, Washington DC, USA

http://siteresources.worldbank.org/INTCCT/Resources/5757608-1234228266004/PRR-CCT_web_noembargo.pdf

This report reviews the evidence on conditional cash transfers (CCTs). This report considers the impact that CCTs have had on current poverty, education, health, and nutrition outcomes. CCTs are programmes that transfer cash, generally to poor households, on the condition that those households make pre-specified investments in the human capital of their children. Health and nutrition conditions generally require periodic checkups, growth monitoring, and vaccinations for children less than 5 years of age; perinatal care for mothers and attendance by mothers at periodic health information talks. Education conditions usually include school enrolment, attendance on 80–85 percent of school days, and occasionally some measure of performance. Most CCT programmes transfer the money to the mother of the household or to the student in some circumstances.

CCTs have increased the likelihood that households will take their children for preventive health checkups, but that has not always led to better child nutritional status; school enrolment rates have increased substantially among programme beneficiaries, but there is little evidence of improvements in learning outcomes. CCT programmes often are described in both extremely positive and negative terms. This review confirms that the programmes have been effective in the sense that there is solid evidence of their positive impacts in reducing short-term poverty and increasing the use of education and health services. Those achievements should not be minimised because they are powerful proof that well-designed public programmes can have significant effects on critical social indicators. It concludes that CCTs generally have been successful in reducing poverty and encouraging parents to invest in the health and education of their children.

Zinc supplementation

Haider, B.A. & Bhutta, Z.A. 2009, The effect of therapeutic zinc supplementation among young children with selected infections: a review of the evidence, Food and Nutrition Bulletin, March; 30(1 Suppl): S41-59

<http://www.ncbi.nlm.nih.gov/pubmed/19472601>

Zinc deficiency is now widely recognised as a leading risk factor for morbidity and mortality and is estimated to be responsible for approximately 800,000 excess deaths annually among children under 5 years of age. This paper evaluates the impact of zinc supplementation as an adjunct in the treatment of diarrhoea and other illnesses in children under 5 years of age.

Current analysis of the adjunctive therapeutic benefit of zinc in acute diarrhoea corroborates existing reviews and provides evidence of reduction in the duration of acute diarrhoea by 0.5 day ($p = .002$) in children under 5 years of age. However, zinc supplementation is found to have no beneficial impact in infants under 6 months of age. A beneficial effect of zinc as an adjunctive treatment is also found in persistent diarrhoea, the duration of which is reduced by 0.68 day ($p < .0001$). To conclude, the existing literature provides evidence of a beneficial effect of therapeutic zinc supplementation in the reduction of the duration of acute and persistent diarrhoea.

Lazzerini, M. & Ronfani, L. (2012) Oral zinc for treating diarrhoea in children, Cochrane Database of Systematic Reviews, Issue 6

<http://summaries.cochrane.org/CD005436/oral-zinc-supplementation-for-treating-diarrhoea-in-children>

In developing countries, diarrhoea causes around two million child deaths annually. Zinc supplementation during acute diarrhoea is currently recommended by the World Health Organization and UNICEF. This review evaluates oral zinc supplementation for treating children with acute or persistent diarrhoea. Twenty-four trials, enrolling 9128 children, were included. The majority of the data was from Asia, from countries at high risk of zinc deficiency, and may not be applicable elsewhere. There is currently not enough evidence from well conducted randomised controlled trials to be able to say whether zinc supplementation during acute diarrhoea reduces death or hospitalisation (very low quality evidence). In children aged greater than six months with acute diarrhoea, zinc supplementation may shorten the duration of diarrhoea by around 10 hours, and probably reduces the number of children whose diarrhoea persists until day seven. In children with signs of moderate malnutrition the effect appears greater, reducing the duration of diarrhoea by around 27 hours. Conversely, in children aged less than six months, the available evidence suggests zinc supplementation may have no effect on mean diarrhoea duration and may even increase the proportion of children whose diarrhoea persists until day seven. No trials reported serious adverse events, but zinc supplementation during acute diarrhoea causes vomiting in both age groups. In children with persistent diarrhoea, zinc supplementation probably shortens the duration of diarrhoea by around 16. To conclude, in areas where the prevalence of zinc deficiency or the prevalence of moderate malnutrition is high, zinc may be of benefit in children aged six months or more. The current evidence does not support the use of zinc supplementation in children below six months of age.

Adolescent nutrition

Haider, R. (2006) Adolescent nutrition: a review of the situation in selected South-East Asian countries, World Health Organization, Regional Office for S.E. Asia

http://www.who.int/nutrition/publications/schoolagechildren/SEA_NUT_163/en/index.html

This is a review of the nutritional status of adolescents living in the South-East Asia Region. It aims to:

- Identify the nutrition problems and risks faced by adolescents.
- Highlight the nutrition problems and risks that can be best managed during adolescence, and therefore call for targeted action.
- Identify and suggest strategic approaches to address these nutritional problems.

Adolescence represents a window of opportunity to prepare for healthy adulthood. During adolescence, some nutritional deficiencies originating during childhood can potentially be corrected, in addition to addressing their current needs. Healthy eating and lifestyle behaviours should be promoted and practiced, thereby preventing or postponing the onset of nutrition-related chronic diseases in adulthood. Undernourished adolescents would require further nutrition interventions, besides proper health care, to improve their health and nutrition

status. While it is important to improve nutrition of both girls and boys, girls demand more attention because of their reproductive role.

Important findings of this review include:

- Adolescents should be recognised as a priority target group and their needs should be adequately addressed in national programmes.
- Adolescents should be considered separately as two groups for programmatic purpose: the younger ones (10-14 years), when 80% of the growth takes place and need for nutrients is very high; and the older ones (15-19 years), whose rate of growth has slowed down but for whom micronutrient deficiency control, especially Iron Deficiency Anaemia control, is important. Health providers should also be aware that adolescents are at risk of health problems prevalent among adults, such as anaemia.
- Multisectoral collaboration for adolescent health and nutrition should be led by the health sector.
- Adolescent nutrition should be mainstreamed and integrated in existing public health programmes that have an adolescent component.
- It is important to include adolescent nutrition as an integral component in National Adolescent Health Strategies that are being formulated.
- There should be clear-cut policy and strategies for reaching adolescents in different settings; school going, out-of-school, in urban slums, rural areas etc.
- Gender issues, behaviour/life-style modification using multisectoral approach should be addressed.
- Involving adolescents and young people in the design, planning, implementation and evaluation of measures to improve their health and nutritional status will increase their ownership.

4. Nutrition interventions for children under 2 years old

Victoria, C., Adair, L., Fall, C., Hallal, P., Martorell, R., Richter, L. & Singh Sachdev, H. 2008, Maternal and child undernutrition: consequences for adult health and human capital, *Lancet*, Vol. 371
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2258311/>

This paper reviews the associations between maternal and child undernutrition with human capital and risk of adult diseases in low-income and middle-income countries. Data from five long-standing prospective cohort studies from Brazil, Guatemala, India, the Philippines, and South Africa was analysed and it was noted that indices of maternal and child undernutrition (maternal height, birth-weight, intrauterine growth restriction, and weight, height, and body-mass index at 2 years according to the new WHO growth standards) were related to adult outcomes (height, schooling, income or assets, offspring birth-weight, body-mass index, glucose concentrations, blood pressure).

Undernutrition was strongly associated, both in the review of published work and in new analyses, with shorter adult height, less schooling, reduced economic productivity, and—for women—lower offspring birth-weight. Associations with adult disease indicators were not so clear-cut. Increased size at birth and in childhood were positively associated with adult body-mass index and to a lesser extent with blood pressure values, but not with blood glucose concentrations. In this analyses and in published work, lower birth-weight and undernutrition in childhood were risk factors for high glucose concentrations, blood pressure, and harmful lipid profiles once adult body-mass index and height were adjusted for, suggesting that rapid postnatal weight gain—especially after infancy—is linked to these conditions.

This review indicates that there is insufficient information about long-term changes in immune function, blood lipids, or osteoporosis indicators. Birth-weight is positively associated with

lung function and with the incidence of some cancers, and undernutrition could be associated with mental illness. It is noted that height-for-age at 2 years was the best predictor of human capital and that undernutrition is associated with lower human capital. It can be concluded that damage suffered in early life leads to permanent impairment, and might also affect future generations. Its prevention will probably bring about important health, educational, and economic benefits. Chronic diseases are especially common in undernourished children who experience rapid weight gain after infancy.

The key messages are:

- Poor foetal growth or stunting in the first 2 years of life leads to irreversible damage, including shorter adult height, lower attained schooling, reduced adult income, and decreased offspring birth-weight
- Children who are undernourished in the first 2 years of life and who put on weight rapidly later in childhood and in adolescence are at high risk of chronic diseases related to nutrition
- There is no evidence that rapid weight or length gain in the first 2 years of life increases the risk of chronic disease, even in children with poor foetal growth
- The prevention of maternal and child undernutrition is a long-term investment that will benefit the present generation and their children

DFID 2009, The neglected crisis of undernutrition: evidence for action, DFID, London, UK

<http://www.cmamforum.org/Pool/Resources/DFID-2009-Neglected-Crisis-of-Undernutrition.pdf>

This paper focuses on undernutrition: the most pervasive form of malnutrition to date in the poorest countries, where DFID concentrates the bulk of its assistance. This Evidence Paper informs the development of a separate DFID Strategy Paper for tackling undernutrition in the developing world.

Early undernutrition and resultant cognitive-social impairment, while preventable, is irreversible after the age of two years. Undernourishment increases the risk of lower cognitive and school performance, and children are more likely to drop out of school. Findings from a longitudinal study in Zimbabwe showed that undernourished preschoolers had, on average, a six month delay in starting school, were 3.4 cm shorter and completed 0.85 grades less schooling as compared with the median child in a developed country.¹¹⁸ A recent multi-country study showed that “for every 10% increase in stunting, the proportion of children reaching the final grade of school dropped by almost 8%. The same study showed that each year of schooling increases wages earned by almost 10%.”¹¹⁹ Children who have been severely undernourished in early childhood suffer a later reduction in IQ by as many as 15 points, significantly affecting schooling achievement. Various nutritional statuses at pre-natal, early childhood and school years have different impacts on muscle and brain development, cognitive and behavioural abilities linked to learning, and on school absenteeism and learning outcomes. In general, undernutrition impairs brain development and cognitive abilities during the early days and can cause delayed enrolment and lower learning outcomes at a later stage. Some effects of undernutrition can be addressed, while others cause permanent damage.

Key messages:

- Of available interventions, for which enough data is available to measure impact, counselling about breastfeeding, fortification or supplementation with vitamin A and zinc, and appropriate management of severe acute malnutrition, have the greatest potential to reduce the burden of child morbidity and mortality
- Improvement of complementary feeding through strategies such as counselling about nutrition for food-secure populations and food supplements, cash transfers, or a

- combination of these in food-insecure populations could substantially reduce stunting and related burden of disease
- Interventions for maternal nutrition (supplements of iron folate, multiple micronutrients, calcium, and balanced energy and protein) can improve outcomes for maternal health and births, but few have been assessed at sufficient scale
 - Available evidence on growth monitoring (without adequate nutrition counselling and referrals) was insufficient for it to be considered an effective nutrition intervention
 - School feeding was considered an ineffective tool for addressing undernutrition amongst children under five years of age
 - Although available interventions can make a clear difference in the short term, elimination of stunting will also require long-term investments to improve education, economic status, and empowerment of women.

Dewey, K. & Adu-Afarwuah, S. (2008) Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries, *Maternal & Child Nutrition* Apr 4 (1): 24-85
<http://onlinelibrary.wiley.com/doi/10.1111/j.1740-8709.2007.00124.x/abstract>

Complementary feeding interventions are usually targeted at the age range of 6–24 months, which is the time of peak incidence of growth faltering, micronutrient deficiencies and infectious illnesses in developing countries. After 2 years of age, it is much more difficult to reverse the effects of malnutrition on stunting, and some of the functional deficits may be permanent. Therefore, interventions that are effective at reducing malnutrition during this vulnerable period should be a high priority. Although several types of interventions can be targeted to this age range (e.g. micronutrient supplementation), a food-based, comprehensive approach may be more effective and sustainable than programmes targeting individual nutrient deficiencies. For this review, a broad definition of ‘complementary feeding interventions’ is used so as to capture the full range of strategies that can be used.

The key findings of the review are:

- Educational interventions that include a strong emphasis on feeding nutrient-rich animal source foods may be more likely to show an effect on child growth than interventions with more general messages about complementary feeding.
- In areas with a high prevalence of food insecurity, complementary feeding interventions that include provision of additional food, not just education, may be more effective.
- Interventions in which micronutrient fortification is the sole component can be effective at improving iron and vitamin A status, but they generally have little impact on growth.
- Appropriately designed complementary feeding interventions can reduce morbidity, but caution is needed to avoid excessive displacement of breast milk and to include counselling on responsive feeding, hygienic practices and continued breastfeeding.
- Recent studies of complementary feeding interventions have suggested a positive impact on behavioural development, which may be a more sensitive indicator of improvements in child nutrition than other outcomes.

Piwoz, E., Sundberg, S. & Rooke, J. 2012, Promoting Healthy Growth: What Are the Priorities for Research and Action? *American Society for Nutrition*,
<http://advances.nutrition.org/content/3/2/234.short>

Healthy growth from conception through the first 2 y of life is the foundation for adequate organ formation and function, a strong immune system, physical health, and neurological and cognitive development. Recent studies identified several low-cost interventions to address undernutrition during this age period and noted the lower returns on investment of intervening after this critical period. Although these interventions should be implemented widely, it is recognised that existing nutrition solutions, even if universally applied, would only avert a minority fraction of the estimated death and disability due to undernutrition.

This paper reviews some of the knowledge and learning needed to close this “impact gap.” Five areas are prioritised for future research: 1) study healthy growth from a lifecycle perspective, because maternal, foetal, and newborn outcomes are connected; 2) understand why growth faltering begins so early in breast-fed infants in the developing world; 3) apply new tools and technologies to study long-recognised problems such as the interaction between nutrition and infection; 4) explore new hypotheses for understanding nutrient assimilation and use to discover and develop intervention leads; and 5) understand the role of the environment in healthy growth and the potential synergistic benefits of multi-sectoral interventions. Policymakers are urged to invest in nutrition-specific and -sensitive interventions to promote healthy growth from conception through the first 2 years of life because of their immediate and long-term health and development benefits.

Black, R., Allen, L., Bhutta, Z.A., Caulfield, L., de Onis, M., Ezzati, M., Mathers, C. & Rivera, J. 2008, Maternal and child undernutrition: global and regional exposures and health consequences, *Lancet*; 371: 243–60
<http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2807%2961690-0/abstract>

This paper estimates the effects of the risks related to measures of undernutrition, as well as to suboptimum breastfeeding practices on mortality and disease. The key findings are:

- Maternal and child undernutrition is the underlying cause of 3.5 million deaths, 35% of the disease burden in children younger than 5 years and 11% of total global DALYs
- The number of global deaths and DALYs in children less than 5 years old attributed to stunting, severe wasting, and intrauterine growth restriction constitutes the largest percentage of any risk factor in this age group
- Vitamin A and zinc deficiencies have by far the largest remaining disease burden among the micronutrients considered
- Iodine and iron deficiencies have small disease burdens, partly because of intervention programmes, but sustained effort is needed to further reduce their burden
- Suboptimum breastfeeding, especially non-exclusive breastfeeding in the first 6 months of life, results in 1.4 million deaths and 10% of disease burden in children younger than 5 years
- Maternal short stature and iron deficiency anaemia increase the risk of death of the mother at delivery, accounting for at least 20% of maternal mortality

5. Indirect beneficiaries of nutrition interventions

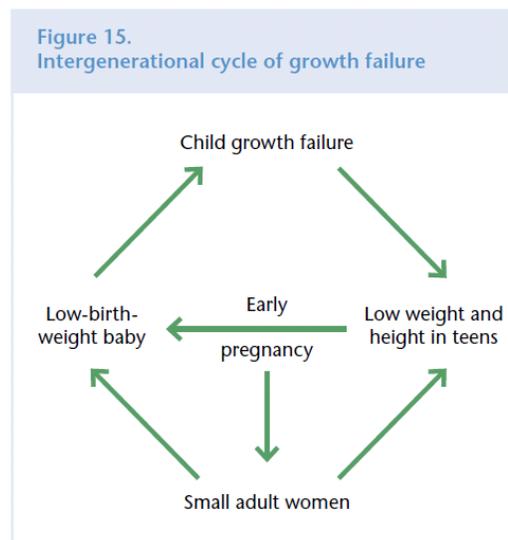
The Coalition for Sustainable Nutrition Security in India. 2008, *Overcoming the Curse of Malnutrition in India: A Leadership Agenda for Action*, 19th September
http://www.mssrf.org/fs/Leadership_Agenda_for_Action.pdf

The national costs of malnutrition are very high: a vicious intergenerational cycle of poor health, high death rates, poor quality of life, decreased mental capacity and reduced worker

productivity. Productivity losses are estimated at more than 10 per cent of lifetime earnings for individuals and 2-3 per cent of gross domestic product for the nation. This means that improvements in nutrition are important for a healthy and productive life as well as for continued economic growth and development.

United Nations System Standing Committee on Nutrition. 2010, *Maternal nutrition and the intergenerational cycle of growth failure*. Sixth report on the world nutrition situation,
<http://www.unscn.org/files/Publications/RWNS6/report/chapter3.pdf>

There is ample evidence that the intergenerational cycle of growth failure could be turned into a virtuous cycle. Birth weight can be rapidly improved, even in populations of short adult women. Improving the diet in quantity and quality can help achieve this. The effects seem to be greater if the mother is reached either during or preferably before the first semester of pregnancy.



Tackling anaemia during adolescence is an important priority that should get much greater programmatic attention. The advantage is that pre-pregnancy nutritional status is improved, and it is nutrition in the early months of pregnancy that has the greatest benefit on birth outcomes. Preventing too early pregnancies is of the highest priority. This programmatic area should include sex education and family planning services for adolescents in order to reduce teenage pregnancy rates. This will be facilitated by a more enabling societal environment, where community norms and values in regard to early marriage, sex education and family planning may need to change. Nutritional and family planning activities will help to break the intergenerational cycle of growth failure and turn it into a virtuous cycle.

School Interventions- Micronutrient supplements, iron supplements, de-worming and counselling

Tackling anaemia during adolescence is an important priority that should get much greater programmatic attention. It is a way of improving maternal health and well-being, as well as preparing for any future pregnancy. The advantage of tackling anaemia in adolescent girls is that pre-pregnancy nutritional status is improved, and it is nutrition in the early months of pregnancy that has the greatest benefit on birth outcomes. Weekly micronutrient supplements can be given, instead of daily ones, to tackle adolescent anaemia. To be most effective, this approach should be combined with de-worming and counselling. All of these

aspects make schools an attractive institutional delivery channel. Reaching adolescents through schools with weekly iron supplementation is an alternative service delivery route; although use of this route has shown little effect in Indonesia (Soekarjo *et al.*, 2004) and Bangladesh (Ahmed *et al.*, 2005), it has been highly successful in India (Vir *et al.*, 2008). The difference in impact is most likely explained by the counselling and de-worming every six months that occurred in the Indian trial but not in the other two.

Impact on Under 2s

A recent success is the “good start to life programme” in Peru which reduced stunting and anaemia dramatically in preschool children by promoting increased food intake and weight gain during pregnancy, exclusive breastfeeding for the first six months and adequate complementary feeding up to 2 years of age (Lechtig *et al.*, 2009). Such interventions do not endanger the mother and do not increase the risk of maternal mortality, as there is no increase in cephalopelvic disproportion, even if food supplementation is provided to adolescent mothers whose birth channels are still not mature.

Renewed investment in adolescent girl and maternal nutrition will contribute significantly to the progressive realisation of the rights of the girl child and of the adolescent mother in the context of the Convention on the Rights of the Child and the Convention on the Elimination of All Forms of Discrimination against Women, as well as making important contributions to achieving Millennium Development Goals 1, 4 and 5.

World Health Organisation. 1998, *Healthy Nutrition: An Essential Element of a Health-Promoting School*, WHO Information Series on School Health
http://www.who.int/school_youth_health/media/en/428.pdf

Nutrition interventions in schools benefit the entire community

School health education about good nutrition also serves as a means to inform families and other community members about ways to promote wellbeing and prevent malnutrition. For instance, educating children about good eating habits has the potential to enhance the nutrition and health status of their younger siblings whom they may take care of as well as of other family members that learn concomitantly with their children. In addition, involving parents in nutrition interventions at the elementary school level has been shown to enhance the eating behaviour of both students and parents.

Research also shows that school health education interventions can be considerably strengthened by complementary community-wide strategies. Thus, schools can be the centre for community enhancement projects that include programmes to improve the health and nutritional status of the community. Schools also provide a setting to introduce new health information and technologies to the community. For instance, the establishment of school canteens offering healthy food choices and practising good food safety is a way to demonstrate how to improve facilities in communities. Furthermore, partnerships between schools, organisations and businesses can benefit both the school and the community, if the partnership is mutually beneficial.

Education (in its own right) and healthy nutrition for girls has a positive impact on the health of families

Improving and expanding educational opportunities for girls is one of the best health and social investments. Improvements to girls' health will in turn improve the health of their children and families because women generally have a major responsibility to care for others within the household. This generally involves household management, food preparation, cleaning duties, obtaining health care, education and supervision of children, all of which can have a significant impact on health.

Furthermore, educated girls are healthier than girls with no or little education. Educated girls and women seek appropriate prenatal care, give birth to healthier babies and bring them home to healthier environments. Research evidence makes it clear that the single most important factor in determining a child's health and nutritional status is its mother's level of education. Malnourished mothers tend to have low birth weight babies, thus perpetuating the problem of malnutrition and ill health from one generation to the next.

For instance, a child's aptitude for formal education may be in jeopardy even prior to school enrolment if the mother suffered from maternal iodine deficiency during pregnancy. Thus, educating young mothers and mothers-to-be is one of the best ways of ensuring the nutritional future of the next generation. In addition, the school system may be particularly useful in trying to supplement the diet of girls before puberty to ensure the remaining growth potential is fully achieved during this critical stage.

Long-Shan, X., Bao-Jun, P., Jin-Xiang, L., Li-Ping, C., Sen-Hai, Y. & Jones, J, 2000, Creating health-promoting schools in rural China: a project started from de-worming Health Promotion International; 15 (3): 197-206.

<http://heapro.oxfordjournals.org/content/15/3/197.full>

Intestinal helminth infection is highly endemic in rural areas of China. This project was implemented to determine if de-worming efforts through schools could reduce helminth infections and successfully serve as an entry point for developing a more comprehensive approach to school health. It is well recognised that these infections negatively affect children's nutrition, physical development and learning potential.

The helminth project helped strengthen communication between the school and parents, interested social groups and township officers, especially those dealing with education and health. Efforts included: teachers' regular visits to students' families, participation of local officers in school activities, and meetings between school headmaster/teachers, parents and community leaders. The activities, communications and relationships between schools and their respective communities were greatly strengthened.

Family health behaviour positively affected

One of the important effects of the project's efforts in encouraging the development of health-promoting schools was health-related behaviour changes among students' family members. Parents were initially informed about the importance of helminth interventions through a consent form that they were requested to sign. In addition, health-related messages were passed on from students to their parents and siblings. Although the changes were not quantitatively surveyed, in the discussions with students and their parents it was found that some new behaviours had been developed and accepted by families, e.g. washing hands before meals and after using the latrine; drinking only boiled water; and quitting or at least reducing smoking among fathers.

Also, studies have also shown that treating children can reduce infections in untreated members of the community, hence reducing the overall transmission, because children contribute egg contamination to the environment.

Glasauer, P., Aldinger, C., Sen-Hai, Y., Shi-Chang, X. and Shu-Ming, T. 2003, Nutrition as an entry point for health promoting schools: lessons from China. *Food and Agriculture Organisation*,

ftp://ftp.fao.org/esn/nutrition/china_fna33.pdf

In collaboration with the Government of China, health-promoting schools (HPS) were piloted in Zhejiang Province. Six primary and secondary schools developed a pilot project to improve

the nutritional and health status of students. A model project was created for nutrition interventions to serve as entry points for the development of HPS. The pilot projects aimed to improve the food intake and dietary behaviour of students, school personnel and parents through nutrition education, improved school meal services and other activities.

Students passed on the information that they received at school about good nutrition to their families and to the wider community. Parents were given leaflets about healthy nutrition and school lunch menus showing a variety of balanced meals that they could prepare at home. Parents and community members were also invited to the schools for lectures and workshops on health and nutrition. In addition, students distributed or read out health and nutrition information to passers-by on the streets. Surveys to evaluate the project found modest but significant effects of the interventions among students, school personnel and parents in terms of knowledge, attitudes and practice.

Centre for Disease Control. 1996, Guidelines for School Health Programmes to Promote Lifelong Healthy Eating. *Morbidity and Mortality Weekly Report* 14 June; 45(RR-9): 1-41.

<http://www.cdc.gov/mmwr/pdf/rr/rr4509.pdf>

Nutrition interventions in schools can give students practice in encouraging parents to make healthy choices about eating and physical activity at home.

6. School Led Total Sanitation

School Led Total Sanitation (SLTS) emphasises the complete elimination of open defecation from the catchments of the schools as a pre requisite for improving hygiene and sanitation. It uses schools to lead these programmes and involves children and the local community in the process, with participatory rural appraisal tools being central to this.

SLTS has its roots in Community Led Total Sanitation (CLTS). This is a methodology for mobilising communities to completely eliminate open defecation (OD). Communities are facilitated to conduct their own appraisal and analysis of open defecation (OD) and take their own action to become ODF (open defecation free). CLTS was pioneered by Kamal Kar. More information can be found at <http://www.communityledtotalsanitation.org/page/clts-approach>

SLTS aims to ensure communities' self-realisation of hygiene and sanitation through sensitisation in schools. These tools empower communities to see improved hygiene and sanitation as a matter of dignity, health and development; and open defecation as the matter of disgust and shame. The schools aim for total sanitation in their catchment area through community outreach, loans and practical assistance and hold a celebration when the area becomes an open defecation free zone.

The adoption of toilets is supposed not only to enhance self-respect, but to bring about a reduction in disease. The results appear encouraging. The number of cases of illness in open defecation free communities is definitely perceived to be lower, as is the number of children failing to come to school because of diarrhoea or worms. Girls not attending school because they are poorly — meaning that they are menstruating, and dare not attend in case of being seen to bleed — are also fewer. In Nepal the health post records and those of community health volunteers show reduced frequency of diarrhoea in the open defecation free declared communities.

Steering Committee for National Sanitation Action, Department of Water Supply and Sewerage and UNICEF, 2006 *Guidelines on School Led Total Sanitation, Nepal.*

<http://www.communityledtotalsanitation.org/resource/guidelines-school-led-total-sanitation-slts>

This comprehensive manual describes the concept of SLTS, its key components, key strategies and step by step activities, based on the implementation experience in Nepal.

Adhikari, K. 2010, School Led Total Sanitation: Principles and Practices. *Journal of water, sanitation, health and environment*; 8; (1), 8 - 10.

[http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/SLTS Principles and Practices Kamal Adhikari.pdf](http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/SLTS%20Principles%20and%20Practices%20Kamal%20Adhikari.pdf)

This report includes strategies, programme activities, resource mobilisation, achievements, capacity development, challenges and recommendations and monitoring and evaluation information about the school led total sanitation programme. This programme emphasises the complete elimination of open defecation from the catchments of the schools as a pre requisite for improving hygiene and sanitation. It aims to ensure communities' self-realisation of hygiene and sanitation through sensitisation. Ignition participatory rural appraisal tools are its backbone. These tools empower communities to see improved hygiene and sanitation as a matter of dignity, health and development; and open defecation as the matter of disgust and shame. The programme envisages for developing school and students role model in sanitation and promoting the use of toilet and proper hygiene behaviour. The ultimate goal of the programme is to build positive attitudes and feelings of self-esteem of users to sustain hygiene and sanitation behaviour. Participation, synergistic efforts, inclusion, innovations and recognition of sanitation as a public good are its guiding principles. The programme has proved to be effective because parents pay interests in school based sanitation program due to the health improvements and maintenance of the privacy of their children, and sustainability of hygiene and sanitation in community continuously backed by school and community partnership.

UNICEF, Nepal: School Led Total Sanitation Seems Unstoppable. *Sanitation and Hygiene, Case Study Number 7*

http://www.unicef.org/wash/files/7_case_study_NEPAL_4web.pdf

This article is about School Led Total Sanitation in Nepal and gives some nice case studies of individual villages, schools and people. It also charts the history of the programme. The UNICEF-supported School Sanitation and Hygiene Education (SSHE) programme imparted a sense of responsibility among students for their own hygiene and sanitary behaviour. They took on duties cleaning the school, sweeping the compound, maintaining the toilet blocks, and other actions to improve the school and feel pride in it. Child Clubs were formed — Nepal has been a pioneer in child participation — and became a positive force for development, drawing upon their teachers' and parents' advice, and running campaigns and awareness creation activities to promote public health.

Recognizing the success of SSHE and the way in which children in Nepal were proving themselves as agents of change, UNICEF proposed a new model to speed up the pace of coverage. This was School Led Total Sanitation (SLTS), and it was designed to build on the existing strengths of local and internationally-reputed programmes. The approach incorporated basic elements of the School Sanitation and Hygiene Education (SSHE) programme, the reward and revolving fund aspects of the Basic Sanitation Package (BSP), and the participatory tools and techniques of Community-Led Total Sanitation (CLTS) adapted from elsewhere. The schools aim for total sanitation in their catchment area through community outreach, loans and practical assistance and hold a celebration when the area becomes an open defecation free zone.

Setiawan, E. & Rahman, Z. *School Led Total Sanitation and Children's Involvement in CLTS*

[http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/SLTS and CLTS in the community.pdf](http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/SLTS%20and%20CLTS%20in%20the%20community.pdf)

This report would be useful for those considering different techniques for implementing school led total sanitation. It focuses on the benefits and challenges of different approaches and the involvement of different actors. It includes experiences from Indonesia, Bangladesh, India, Kenya and Nepal and other participating countries of Africa.

Verma, A. *Children/School Led Total Sanitation: experience from India and Cambodia.* Knowledge links, India.

<http://www.communityledtotalsanitation.org/resource/children-school-led-total-sanitation-experiences-india-and-cambodia>

This paper describes experiences of Community Led Total Sanitation with children in schools and villages in India. Examples are given of how children have acted as change agents in Himachal Pradesh, Uttarakhand and in some other states of India. Research is also presented from Cambodia.

The key lessons learnt include:

- Children are effective catalysts. They help create an enabling environment in school and then carry the messages back home to motivate their families to improve sanitation and hygiene habits.
- 'Triggering' children is not sufficient. Success largely depends on the understanding and knowledge of teachers. It is good to trigger children and teachers simultaneously. This would help in bringing attitudinal and behaviour change not only in children but also in teachers. If teachers are not fully sensitized they may not effectively inspire enough confidence in the children or community at large to mobilize them to take action
- Children are free and frank; once they understand something do it wholeheartedly. Children are great motivators to make their parents understand the importance of toilet and its usage.
- Post triggering activities of children in the village such as: children rally, vigilance by children etc. act as reinforcement of facts and do not let the spark extinguish ignited on the day of triggering
- Triggering in schools also sensitizes the teachers about the importance of sanitation and helps facilitate the process with the children.

The Pan African CLTS Programme. 2012, *Empowering self-help sanitation of rural and peri-urban communities and schools in Africa.* Plan, Amsterdam

[http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/Annual report 2011 PanAfrica.pdf](http://www.communityledtotalsanitation.org/sites/communityledtotalsanitation.org/files/Annual_report_2011_PanAfrica.pdf)

The Pan African CLTS programme is co-financed by the Dutch Ministry of Foreign Affairs and implementation started in January 2010. This annual report gives an update on progress made in the period January 2011 to December 2011.

The key lessons learnt include:

- Once communities are sensitized they can play a great role in the sustainability of their water and sanitation facilities.
- The formation of a network of natural leaders can led to programme success and sustainability
- Community experience sharing visit between triggered community and post ODF communities will enhance the adoption of new ideas, creativity and innovations in CLTS approaches and methodologies.

- The use of bamboo cane as a local hand washing device is a new idea discovered by some Natural leaders from other district within the country. These ideas have been cascaded to many other CLTS areas.
- Religious dimension can successfully be used to trigger shame and disgust, leading rapid to community ignition.
- Planned hygiene promotion is essential in post-triggering phase to accelerate the pace of behaviour change.
- The CLTS process helps the re-emergence of communal spirit in the communities.

7. Other Useful Resources

WHO. 1996. *Promoting Health Through Schools: The World Health Organization's Global School Health Initiative*. Geneva: WHO,
http://whqlibdoc.who.int/trs/WHO_TRS_870.pdf

Kelder, S. H. *et al.* 1995, Community-wide youth nutrition education: long-term outcomes of the Minnesota Heart Health Programme. *Health Education Research*, 10(2): 119-131.
<http://www.ncbi.nlm.nih.gov/pubmed/10160226>

Sherman, J. 2003, From nutrition needs to classroom lessons: can we make a difference? FAO
<ftp://ftp.fao.org/docrep/fao/006/j0243m/j0243m06.pdf>

Alvarez, I. 2005, School gardens: education and nutrition go together. FAO
<http://www.fao.org/newsroom/en/news/2005/104116/index.html>

Menza, V & Spagnoli, F. 2003, Feeding Minds, Fighting Hunger: A global educational initiative for children. FAO.
<http://www.fao.org/docrep/006/j0243m/j0243m10.htm#ART9>

Beaton, G. H., Calloway, D. H. & Murphy, S. P. (1992) Estimated protein intakes of toddlers: predicted prevalence of inadequate intakes in village populations in Egypt, Kenya and Mexico. *Am. J. Clin. Nutr.* 55: 902–911.
<http://www.ncbi.nlm.nih.gov/pubmed/1550075>

Taylor-Robinson D., Maayan, N., Soares-Weiser, K., Donegan, S. & Garner, P., 2012, De-worming drugs for soil-transmitted intestinal worms in children: effects on nutritional indicators, haemoglobin and school performance. *Cochrane Database of Systematic Reviews*
<http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD000371.pub4/pdf>

8. Additional information

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