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Development. Malnutrition. Vitamin A
**Badly nourished populations
need good food**



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[Access May 2010 WN cover on vitamin A policy here](#)

[Access May 2010 Editorial on vitamin A policy here](#)

[Access May 2010 Michael Latham on The great vitamin A fiasco here](#)

[Access June 2010 letters in response to The great vitamin A fiasco here](#)

[Access July 2010 letters in response to The great vitamin A fiasco here](#)

[Access October 2010 letters in response to The great vitamin A fiasco here](#)

[Access September 2012 Independent Science News Ted Greiner on vitamin A here](#)

[Access 2013 FAO Ted Greiner on vitamin A and food-based solutions here](#)

[Access October 2014 IJE John Mason, Ted Greiner et al on vitamin A policy here](#)

[Access November 2014 John Mason, Ted Greiner et al on vitamin A policy here](#)

[Access April 2015 Ashok Bhurtyal, Dushala Adhikari on vitamin A policy here](#)

Editor's note

This is an edited extract from the referenced [editorial in the first issue of WN](#) in May 2010, introducing the momentous commentary by Michael Latham, 'The great vitamin A fiasco'. It applies in 2015 as much as in 2010, as Ted Greiner shows in his commentary here.

Shortage and deficiency of vitamin A, contained in many fruits, vegetables and other plant foods as carotenoids, in breastmilk, and a few animal foods as retinol, plus vulnerability to shortage or deficiency, is officially agreed to be one of the big three world undernutrition crises. The most recent WHO estimates, from over a decade ago, are that some 190 million children and 19 million women had low levels of serum retinol, and that 5 million pre-school children and 10 million women had some degree of night blindness a year of which between a quarter and a half a million went blind and often died, unless treated.

Prevention is usually in the form of twice-yearly administration of massive doses of retinol. This is given to children aged 6-59 months in over 100 countries identified as at risk of deficiency. The agreed targets include every reachable child in all the 61 countries where death-rates in children under 5 are higher than 70 per 1,000, a figure not much higher than the global average. This is taken to be a reliable proxy for risk of vitamin A deficiency. The strategy has, so it is said, the potential to avert the deaths of over a million children a year.

Problems with external intervention

But is vitamin A deficiency now a vast global emergency? Does supplementation with massive doses of retinol prevent blindness and deaths of hundreds of thousands of children every year? And is this strategy without problems? In the judgement of Ted Greiner, and of Michael Latham and many others with long sustained first-hand field experience, the answer to all three of these questions is no. They believe that the continued very large-scale commitment and investment in 'top-down' external interventions to prevent loss of sight, blindness and death in children, and the relative and sometimes almost complete neglect of broad public health approaches, is bad science and bad policy.

When children are actually suffering from clinical xerophthalmia they do indeed need supplements of vitamin A, either from local sources such as palm and other oils, or from capsules. Such interventions, preferably managed by community leaders or locally-based professionals, certainly protect the sight of children who are seriously deficient in vitamin A.

But the main commitment of UN agencies and national governments should be to foster 'bottom-up' programmes that begin with family, community and local support and empowerment. The first priority should be exclusive and sustained breastfeeding. The next priority is adequate supplies of vitamin A from a great variety of plant foods, and from the few animal foods that are affordable good sources, combined with public health measures, including de-worming. This requires nationally and locally-controlled strategies that ensure security of production and distribution of a variety of available, accessible and affordable nourishing foods, including those that are rich or good sources of vitamin A. In turn this will also encourage family, community, and national capacity to prevent malnutrition, and also to protect against other diseases and to promote well-being.

Ted Greiner's commentary is illustrated by pictures of readily sustainable community-based initiatives in Bangladesh, where he has done much work. Food-based programmes, which include education, encourage homestead and school gardening, protect overall health, and prevent deficiency conditions and diseases with appropriate and nourishing plant foods.

Understanding the donor world



It is high time that all affected governments, together with partners in relevant UN agencies, give the highest priority to supporting the people of their country to grow, harvest, enjoy and market plant foods that are rich in vitamin A – and also in very many other nutrients. Here is a farmer in Bangladesh with her crop of pumpkins

In this commentary I am mainly concerned with the still-unresolved issue of how best to prevent vitamin A deficiency. This has a context: the ways in which national development and aid agencies work. My experience includes being the nutrition advisor to the Swedish International Development Cooperation Agency (Sida) from 1985 to 2004. I did the field work which was the basis on which Sida decided to switch its vitamin A support to Bangladesh from capsules to the food-based approach. I also assisted the Tanzania Food and Nutrition Centre in planning its national vitamin programme in the 1990s, which included both food-based approaches and disease-targeted capsules.

I was chair of the bilateral (donor) constituency of the now almost defunct UN System Standing Committee on Nutrition (UN SCN) from 1990 to 1995, and then chair of its civil society constituency from 2007 until the ending of non-UN agency involvement a few years ago. I have also done two large projects for the UN Food and Agriculture Organization involving breastfeeding and the food-based approach to combat micronutrient deficiencies.

All international donors struggle to find new and more effective ways of investing money. What are the development problems? What are the local resources and capacities already mobilised to solve them? Which local human resources are ample and thus could quickly solve more problems if more funds were available? Which local organisations are effective and free from corruption?

When I first began working with Sida in 1985, a wise experienced consultant warned me, 'You need to realise that Sida's job is quite tricky. They have to be relieved of large quantities of money without this causing any headlines in the papers'. Like Sida, most bilateral agencies' main worry, kept of course to themselves, is about the risk of making bad investments and thus getting attacked in the media. Once one donor has done the work to decide that it is a safe bet to make a certain type of investment by way of a certain organisation, other donors follow, saving themselves the trouble and expense and, they hope, reducing their risk of getting unwanted headlines.

A related problem, equally secret, is the need to avoid having unspent money each budget year. There are always conservatives who hate giving money to impoverished countries, who are ready to pounce on these agencies and use unspent money as an excuse for cutting their budgets next year. When I had programme officers interested in nutrition and willing to work with me, I would sometimes get calls like this: 'We are realising that the funding budgeted for primary health care support to [country X] will not get spent. If you have any nutrition project ready to go on short notice, send me the proposal.' I always had a couple handy, and nutrition had the reputation of spending the money as budgeted with no problems.

Fortunately for the donor agencies, there is little media scrutiny of any but big or already controversial projects such as large dams, power plants, family planning and AIDS programmes. For others, especially relatively small investments, I was once present when the lawyer for Sida was asked who makes the decisions. He replied, 'Each programme officer is a king or a queen.'

Another big problem is lack of people working in aid agencies. They are classified in annual reports as 'administrative costs' and for political and voter support reasons, such costs must be kept low. But as gross national products increase, or the political will to support development strengthens, more and more money has to be spent by the same number of people, putting programme officers under great stress. Sida's answer to this was to cut to a minimum the number of countries and fields to which support was provided. Thus by the year 2000, nutrition, which for decades had been a major area of support, simply disappeared from its agenda.

Representative of a few countries called Sida on this during international meetings and were told that Sida didn't need to justify its decision-making to them. (The real reason for nutrition being included among the fields being dropped was that the young, aggressive physician running the health division of Sida didn't like it.)

A similar process had already occurred among most other European donors during the 80s and 90s. When I started attending the UN SCN as the representative from Sweden in the mid-1980s, countries like Australia, Switzerland, Ireland, France and others were active participants. By the 1990s they had dropped out and by 2000 very few were left. The US and Canada were left as almost the only acts in town, one of the main reasons that community-based and food-based approaches, widely discussed in the 1980s, never took off on a large scale.

The ‘quick fix’ tactic

These and some other donors have typically turned to ‘quick fixes’, like micronutrient supplementation. Such strategies are based on inadequate scientific research that is difficult to challenge, because large-scale donor support builds reciprocal support from special interests, including in the academic community. It is easier – and also profitable – for pharmaceutical companies to manufacture vitamin pills or fortified supplemental foods than it is for governments to address the underlying and structural causes of malnutrition, or to improve diets on a large scale in lower-income countries.

However, as Nobel economics laureate Amartya Sen has pointed out, malnutrition is not a result of shortage of food, but of inadequate access to food (effective demand), which in turn has social, economic and political determinants. Donors have largely ignored this fact. But now there are pioneering efforts to change the nutrition debate, and to help communities to feed their families adequately.

Malnutrition in the classic sense of undernutrition and deficiency has of course always been a problem of the human race. In the modern age of nutrition science, attention has focused on specific elements of diets. In the 1960s it was believed that the main cause of malnutrition was protein deficiency, manifest as what was then believed to be the very widespread prevalence of kwashiorkor, so most donors invested in finding and distributing novel sources of protein based on domestic interests and capacity. Norway, for example, explored whether low-income people could get used to consuming fish powder (the answer was pretty much no).

In 1974 Donald McLaren, a British academic then working in Lebanon, published a paper in the influential journal *Lancet* entitled ‘The great protein fiasco’ (1). This had the influence needed to shift the protein paradigm. He pointed out that in nearly all cases traditional diets, when adequate in quantity (calories, meaning dietary energy), provided enough protein.

From being at the top of the nutrition policy agenda, isolated protein deficiency has since been relegated to a position of minor importance. Donald McLaren made the nuanced point that poverty was the cause of malnutrition. A few years later Amartya Sen added to that understanding by arguing convincingly that lack of entitlement was the cause of famine (2).

From protein to calories to vitamins



Support for horticulture of nutrient-rich foods of plant origin should be explained and amplified by education and information programmes of all types and at all levels, in every country. Schools are ideal. Here is a primary school garden tended by children as part of their education, in a rural district of Bangladesh

Perhaps inevitably, this became simplified by donors to mean that getting more calories to the people was the answer, with the focus shifting simply to dietary energy from any source, even if that meant adding sugar to children's food. This presented its own problems. By that time food supplies in most countries where undernutrition was a public health issue had already changed to a mixture of traditional with industrialised, which were depleted in various nutrients. So attention switched to other dietary aspects – specific micronutrients, which is to say vitamins and minerals.

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The 'quick fix' tactic

The next move of the dominant policy-makers was to identify what has become known as 'hidden hunger', meaning deficiency of specific micronutrients. Literally billions of people were estimated to be at risk of being deficient in iodine, iron, or

vitamin A, and zinc was later added to the list. These nutrients have little involvement in growth retardation and thus are not responsible for the huge remaining problems of undernutrition and nutritional stunting – factors linked to poverty remained the leading causes of them (and of micronutrient deficiencies, with the partial exception of iodine). Nonetheless by the mid 1990s, micronutrient deficiency had risen to the top of the nutrition agenda among donor agencies.

Initially, nutrition planners presented decision-makers with three options for dealing with widespread deficiency of a nutrient like vitamin A (early on considered to be a global public health crisis mainly because it causes blindness in young children):

- *The short-term, stop-gap measure*
Providing all young children with mega-dose capsules (200,000 IU) of vitamin A semi-annually.
- *The medium-term but sustainable approach*
Mandating fortification of some staple food or condiment with vitamin A. (Voluntary fortification simply stratifies consumption into those who are better off and consume the more expensive fortified food and those who really need the fortified food but are unwilling or unable to pay the extra cost.)
- *The long-term solution*
Improving the diets of whole populations or of vulnerable groups. Used in industrialised countries, especially in most of Europe that has little poverty and little food fortification.

The long-term approach sometimes also includes infection control (especially for intestinal parasites, which compromise absorption of pro-vitamin A from plants) and breastfeeding protection, support and promotion. Both the medium- and long-term approaches provide vitamin A to everybody, not just young children. Fortification can and often should include a few additional nutrients, but the long-term solution alone provides a wide range of nutrients, including vitamins, minerals, and essential fats, and other healthy bioactive components such as dietary fibre and polyphenols.

An early study found that after two years of implementation, a broad strategy called the ‘public health approach,’ including basic health care and sanitation as well as assistance in growing vegetables and fruits that are good or rich sources of beta-carotene (the precursor of vitamin A as retinol) failed to show an impact on vitamin A deficiency, though it did reduce worm infestations and improved the growth of children (3). This suggested that a more intensive or longer period of programme implementation might be needed. The public health approach was not explored further, because a new strategy took centre stage. Around 1990, several studies seemed to indicate that giving large doses of vitamin A periodically might reduce mortality in young children, for reasons that are still obscure. Immediately, only the quick fix would do.

Let them eat capsules

Over the next decade, nearly all lower-income countries were informed about their likely vitamin A deficiency problem and to tackle it were offered vitamin A capsules or nothing. It was their choice!

The capsule programme was and still is funded largely by the Canadian International Development Agency (CIDA) and also by the US Agency for International Development (USAID) and the UN Children's Fund (UNICEF), with some recent support from the vitamin manufacturers by way of the business-oriented non-government organisation Vitamin Angels.

This vitamin A supplementation strategy has grown continually for three decades, and is now achieving global coverage rates of about 80 per cent, despite what is now the conclusive evidence that the capsules have little, if any, impact on children's vitamin A status. This is because the impact disappears after about two months, leaving the children deficient for most of the year. Since the widespread implementation of the vitamin A capsule programme, mild and moderate vitamin A deficiency has declined only very gradually, indicating that complementary approaches are not being implemented.

Meanwhile, it turns out that any mortality-reducing impact the capsules may have had seems to have greatly declined. That original impact appears to have operated mainly by way of the close link between vitamin A and measles, though there may be a link with some forms of diarrhoea as well. But measles vaccination and diarrhoea control have made progress in most countries since the initial 1990-era studies were done. Research done since then, including a trial of 1 million children in northern India, has not been able to confirm any mortality-reducing impact of the capsules in young children (4,5).

John Mason and colleagues, who include me, have recently shown how the impact of megadose vitamin A on childhood mortality has declined almost to no impact at all (4). They point out that in any case the vast majority of childhood mortality is now concentrated in newborns, for whom vitamin A supplementation appears not to be protective (6,7).

'The great vitamin A fiasco'

Now more questions are being asked and resistance is evident, thanks in part to Michael Latham, who published a seminal paper in the first issue of *World Nutrition* in May 2010 entitled 'The great vitamin A fiasco'. This sharply criticised the vitamin A capsule global strategy (8). (See Box 1, below).

Box 1

The vitamin A capsule strategy – end in sight

*Edited extract from the fully referenced [The great vitamin A fiasco, by Michael Latham](#) published in the first issue of *World Nutrition* in May 2010 (8).*

In 2010 it is indefensible that the huge vitamin A medicinal capsule programmes not only continue, but are being made even more colossal. Much of the nutrition world has simply failed to study and keep up with the evidence and the testimony of those with local knowledge or, if they have, seem to be unable or unwilling to challenge the status quo.

Xerophthalmia, leading to blinding keratomalacia, remains a public health nutrition problem and even an emergency in some parts of some lower-income countries. However, most nutritionists, physicians and others with direct field experience have, over the last several years, almost universally expressed their certainty that serious xerophthalmia and resulting blindness is now very rare now compared with the estimates made in the 1970s. I personally have heard this strong statement from leaders in India, Bangladesh, the Philippines, Indonesia, Tanzania, Kenya, and other countries.

The paradigm is shifting

Since its beginning, I have been a player in and an observer of the process by which prevention of vitamin A deficiency has been transformed into a universal indiscriminate programme using medicinal doses of vitamin A capsules, claimed to be saving the lives of millions of young children. Over the years, with many colleagues in Asia, Africa and elsewhere, I have become increasingly dismayed by the march of events.

Previously, I was centrally engaged in the politics of protein and the alleged pandemic of protein deficiency. This led to a gross over-reaction from United Nations agencies and their partners. This in turn led in the mid 1970s to a ‘paradigm shift’: a sudden collapse of confidence in the global ‘protein gap’ hypothesis. History is about to repeat itself, and for much the same reasons.

Time to end quick fixes

The capsule-driven academics and their colleagues outside the research community have buttressed their position by publicising research whose results seem to show that vitamin A deficiency cannot be prevented or controlled adequately by food-based and public health approaches. The implications of these research findings have been exaggerated to further support a policy already on shaky ground.

This must now all change, and be replaced by what was originally intended – sustainable food-based strategies. These also promote family and community life, provide employment and strengthen local economies, prevent other diseases, and promote well-being. They are – or should be – part of integrated primary health care programmes. They also enable impoverished countries to become less dependent. They should become first priorities, at Secretary-General and head of state levels, of the range of relevant United Nations agencies and of national government departments responsible for justice, employment, agriculture, food security and rural development, as well as for health. They already have the support of many health professionals with field experience, and of international, national and local non-government, civil society and citizens’ organisations and groups committed to the maintenance and protection of human rights and entitlements.

He advocated phasing out supplementation in favour of long-term approaches, and was supported in this by many others with long first-hand knowledge, including senior officials at the UN Food and Agriculture Organization (9-11). But vested interests have resisted, and donors do not want controversy, uncertainty, or anything labelled 'untested' from the scientists they work with. Michael Latham was quickly attacked by the academic community engaged with the current programmes centred on capsules.

The frustrations with the vitamin supplementation strategy are as follows. First, its expense (low for donors but high, especially compared to alternatives like home gardening that beneficiaries can earn money from). Second, its opportunity cost. Integration into existing health sector routines does not result in high enough coverage to have impact, so twice a year they must stop everything else to deliver capsules (though other activities are often included). Third, it has put a stop to the implementation of other approaches.

In 1981 Sida began supporting a universal vitamin A capsule programme in Bangladesh, with UNICEF. It was estimated that 30,000 children a year there were going blind due to vitamin A deficiency. But by 1989, the programme was clearly not working. The coverage rate was rarely much over 50 per cent, and public health benefit begins to occur only when about 65 per cent coverage has been achieved. This is because the easiest half to reach with the vitamin A capsules are the children least likely to need them (12).

Sida therefore asked me to explore what else the government and other donors were doing to solve the problem, so they could consider shifting their support to something that might work better. Both the government and donors said something like, 'Well, we have so many other priorities here in Bangladesh so we don't do anything for vitamin A deficiency. After all, we have the capsule programme to fall back on'. This was when I realised that the programme was not only ineffective, it was preventing anything else more effective from being done instead (13).

Years later, as director of the Ultra Rice Programme (conventionally fortified, not genetically modified rice) at a non-profit organisation, Program for Appropriate Technology for Health (PATH), I tried to interest some governments in fortifying their rice with various nutrients, though vitamin A was the only one the efficacy of which we had research support. They all said they had no interest, as their young children were already receiving huge doses by capsule, and retinol causing adverse effects at high doses, a fortified food might throw them into a state of excess.

In addition to such ways in which vitamin A capsule programmes obstruct other approaches, well-meaning scientists and UN staff have believed that other approaches take attention and resources away from achieving adequate coverage for the capsule programme. They have criticised and downplayed other approaches in policy forums, especially for about a decade beginning in the early 1990s.

Thus the supplementation strategy, originally considered to be a stop-gap measure to be implemented only until more sustainable approaches could be put in place, has prevented the other strategies from ever getting a chance to scale up and so reduce or remove the need for the capsules. The solutions include conventional fortification and biofortification, which deliver physiological doses of vitamin A that do not cause side effects, or harm children who already have enough vitamin A, as capsules containing pharmacological doses appear to do in many cases (14,15)

Common foods are protective

A wide variety of common and indigenous foods have also been proved to be effective in improving vitamin A levels even in short-term trials. In 2013 I reviewed the literature on the efficacy of high-carotene food outside of the context of fortification, in a report for the UN Food and Agriculture Organization in preparation for the Second International Conference on Nutrition (16).

Of 27 papers published since the First Conference in 1992 documenting results from trials on the impact of 38 foods, 25 had a net positive impact on serum retinol, and 18 on serum beta-carotene. The statistical significance of these differences was in most cases not indicated. An additional five foods increased serum retinol and serum beta-carotene but had no control. In the case of two food trials, there was no impact on serum beta-carotene; in four food trials, there was no net impact on serum retinol, and in two trials, there was a small negative change in serum retinol. Five food trials increased breastmilk serum retinol (one with no control) and one decreased it.

Food-based approaches are complex to implement and evaluate and take time to mature and exert their impact. But unlike supplementation, they reach all members of the community, are safe for pregnant women, have no side effects, are sustainable, and confer a wide range of benefits in addition to improving vitamin A levels. Food-based approaches are also often portrayed as being expensive, but this is only true from a donor-centric way of viewing costs. From the point of view of host countries, communities and families who grow vitamin A-rich foods, the economic benefits alone are likely to outweigh the costs.

The Bangladesh experience

Unlike the North American donor agencies, that constantly have to prove the worth and impact of their work to their doubtful taxpayers, European donor agencies tend to work quietly, knowing they have the support of most of the people whose money they are spending. They do little work in most technical areas like nutrition, because they have small budgets for hiring domestic expertise, preferring instead to focus on very few areas in which they have some kind of comparative advantage. They do little operations research, make few presentations in scientific meetings, and publish few results of programme-relevant research. The UK Department for International Development (DFID) is a partial exception.

Growing good food



*A Bangladeshi husband and wife in their vegetable garden.
Family farms and smallholdings in less-resourced countries provide nourishing food for families and local communities, preserve and develop valuable skills, and are economically, socially and environmentally beneficial and sustainable*

Thus the Swedish experience concerning vitamin A, while instructive and perhaps unique, is not widely known. As stated above, Sida discovered that the vitamin A capsule programme they had been sponsoring in Bangladesh along with UNICEF was not working. It was started in the early 1970s, but by 1989 distribution campaigns still tended to reach only a little over half the children in the country, while as said above, 65 per cent coverage was needed for public health impact. Additionally, some 22 million capsule doses were unaccounted for annually. These doses could do harm, especially if given to pregnant women.

Thus Sida decided to withdraw funding from the capsule programme in Bangladesh. It did so cautiously over a few years in the mid-1990s and only when the World Bank agreed to pick up funding for it. Apparently there was a period when funding was inadequate to keep the programme going. Sida was then castigated at meetings for 'not caring that once again, 30,000 Bangladeshi children a year were going blind'. A paper in a scientific journal even claimed that the Swedish government stopped funding for the programme only after coming under 'political pressure' (17).

Sida decided to shift its funding to some other approach. In Bangladesh they chose an innovative, large-scale communication and small-scale horticulture programme run by Worldview International, a non-governmental organisation based in Sri

Lanka, little known in the nutrition world, because as a communication network, it works with ministries of education, not with the health or agriculture ministries. Covering every rural household in entire districts, and reaching a total of 9 million people in districts with the highest prevalence of vitamin A deficiency (18), it was able greatly to increase the consumption of high-carotene foods in the diet of pre-school age children, at a cost of US\$ 0.13 per head per year (19).

Once its systems were well developed, which required about eight years of gradually improving its methods in a few districts, it then needed only about three years to achieve effective implementation per district. This involved using a range of media and face-to-face nutrition education activities in villages by female volunteers to increase the demand for local high-carotene foods, and to help villagers grow their own. To assist landless families, three seeds each of three varieties of plants that grow on vines (squash, pumpkins and beans) were provided to every household in the district. These foods were then widely planted on rooftops, trellises, and even on nearby trees. Early results from this project were presented in some international meetings in 1993, but the most powerful organisation, the International Vitamin A Consultative Group, declined to have them presented.

Since food-based programmes received so little publicity, the fact that so much was achieved at such little cost was no embarrassment to supporters of vitamin A capsule distribution and had little impact on donors. However, more questions are now being asked and more resistance is evident, thanks in part to Michael Latham (8) and his supporters. (See Box 2, below).

When I published a follow-up paper two and a half years later (20), the main proponent for the continuation of the capsule approach refused another journal's request for a written debate of the issues. The publication of two trials showing no mortality-reducing impact of capsules was delayed for many years, the reason no doubt being that once published they would cause career-damaging attacks. Scientists who are critical of the capsule strategy continue to find it difficult to publish papers on this subject. Journals use peer reviewers who advise against publication of anything that threatens the status quo. But after Michael Latham's investigations, backed by many colleagues in the countries most affected, it is increasingly hard to ignore the facts and the solutions that work.

Global policymaking forums should stop calling for an immediate elimination of vitamin A deficiency. This plays into the hands of the rapidly deployed capsule approach. Instead, there should be a general call for the replacement of supplementation programmes with sustainable food-based approaches (4-13,16, 20). Less resourced country governments should assign responsibility and funding to specific organisations that are then given quantified and timed targets and are held accountable to meet them. Donors could assist by funding components of national plans for making this shift, including simple dietary assessments.

Box 2

Prevention and control of vitamin A deficiency

Edited extract from the fully referenced [The great vitamin A fiasco](#), by Michael Latham, published in the first issue of WN in May 2010 (8).

The essential way to prevent shortage and deficiency of vitamin A – and also of a range of nutrients and protective factors – in infants and young children, is breastfeeding. Humans are evolved so that breastmilk is normally a more than adequate source of vitamin A, and colostrum, which is richer in vitamin A than breastmilk, is a natural vitamin A booster.

A major reason for vitamin A deficiency during and since the second half of the last century, has been a reduction of breastfeeding. Government-led policies and actions, including legislation, involving all actors, that result in a higher proportion of mothers breastfeeding exclusively for 6 months, and continuing to feed breastmilk to their children for 24 months or longer, will correspondingly reduce shortage or deficiency of vitamin A. This will also protect against other forms of malnutrition, and infections which in turn increase vulnerability to malnutrition. It is rational to ensure that women of childbearing age in locations where clinical deficiency among children is a problem, have adequate vitamin A stores. This is best done by ensuring food supplies high in carotenoids and, when readily available and affordable, animal foods high in retinol.

Plant-based food systems are best

Within countries where vitamin A deficiency remains an issue, governments at all levels, from national to local, need to support and encourage food systems that include leafy vegetables, fruits and other plant foods that are good, rich or very rich sources of carotene. Some of these, such as mangoes, yellow sweet potatoes, carrots, some palm and other tree fruits, and red palm and other plant oils, are well known and commonly available. The abundance of plants rich in carotenoids varies from country to country.

Many of these tend to be overlooked in expert reports, especially when they are tropical foods not known in temperate countries where reports tend to be written and food composition tables compiled. Indeed, some exceedingly rich sources of carotene such as palm and other fruits, tend to be overlooked even in the countries where they are native or established, one reason being that they often grow wild, and even when cultivated do not feature in international or national food composition tables.

Promotion and support for home, school, and community gardening is important. These approaches also have many other benefits. They are family- and self-reliant approaches. They are local, and often culturally appropriate and environmentally beneficial. They contribute to reducing chronic disease. They are sustainable.

Diets that include an abundance of vegetables and fruits, both cultivated and wild, contribute very significantly to good nutrition, including vitamin A status. Animal foods and other plant foods, especially when fresh, are also nourishing. Such diets also protect against various diseases and contribute to well-being, something capsules cannot do.

The antioxidants in these foods reduce the negative impact of free radicals which contribute so importantly to chronic disease including cancer and heart disease. These chronic conditions are now the leading causes of mortality in Northern countries, and now in most Southern countries, and even in some sub-Saharan African countries.

How to phase in a food-based strategy



Rekha, a Bangladeshi mother, in the fields of her farm with her little children. Hands-on experience of traditional, local, sustainable food systems, suitable to feed families and neighbours and to supply nearby farmers' markets, is a life-long rewarding lesson that also supports sustained local economies

Very few low-income countries are willing or able to pay for capsule programmes themselves, or to fund careful capsule phase-out programmes. Many of the countries with the necessary resources, such as India, Brazil, and Vietnam, have gone their own way with their own programmes in any case, and have avoided getting stuck in the universal capsule paradigm exclusively. Therefore, no real attempts to learn financially, technically, and managerially how such a phase-out can best be accomplished have yet been made.

What therefore is needed, is a concerted initiative from some lower-income countries with enough human and material capacity, which could be supported by donors prepared to fund initiatives whose driving force comes from within the countries themselves, starting at local level. My proposals follow:

1. Put in place, perhaps first on a pilot scale, various programmes designed to raise vitamin A levels and tailored to local circumstances, customs, preferences and needs. These could include the following:
 - A. Fortification of a staple food, such as vegetable oil or rice, is likely to be the simplest, cheapest, and most effective method. But governments will need

convincing to try it. A temporary monitoring system could be established to ensure that excess vitamin A problems are not taking place among the young children who are still being given vitamin A capsules. If overdoses are felt to be a problem or are found to be common, capsule programmes could be phased out more rapidly (or phased into disease-based approaches, or distributed to people with a proven deficiency).

- B. Other food-based approaches such as an increase in the availability of suitable food sources combined with nutrition education. The foods will usually contain vitamin A from plant foods in the form of beta-carotene. Based on successful experience so far, programmes can include home and community gardening, dissemination of fruit-tree seedlings, village-level solar drying of fruits. They can also come from animal foods in the form of retinol. This could involve increased local production of eggs, increased availability of small amounts of liver, or increased farming of inexpensive small fish (fisheries focusing on popular large fish or shrimp are income-generating, not for local consumption). Programmes based on animal foods will not need to focus much on deworming or nutrition education to be effective, except where there are local taboos to their use in infant and young-child feeding or for pregnant or breastfeeding women. Any animal food programme must add a third component: addressing the additional food safety needs involved in production, storage, and home preparation.
- 2 Set up a monitoring programme to assess micronutrient status. For food-based programmes, Helen Keller International has established a very simple dietary assessment tool that has been validated for use at the community level. (21). However, in some countries, milk or breastmilk must not be ignored, as the Helen Keller method recommends (22,23). If a staple fortified food or condiment replaces capsules, then perhaps only consumption of that vehicle for the nutrient need be monitored. A monitoring system examining young-child vitamin A levels a few months after each capsule dose is provided could also be useful. (If it remains high, capsules are no longer needed).
- 3 Set up routine decision-making systems, perhaps at district level, for deciding when to phase out universal vitamin A capsule programmes. The Tanzania Food and Nutrition Centre developed and used such a system with Sida funding for shifting from iodised oil capsule distribution to fortified salt (24). Decision-making in that case was done at district level every two years. using a combination of simple survey and qualitative methods.

World hunger has become big business. For decades, one money-making scheme after another has been sold by corporations to the governments of donor countries and to big donors as strategies guaranteed to end hunger. Most are not taken seriously. Some, like the vitamin A capsule strategy, though benefiting the bottom lines and reputations of the transnational and other big vitamin manufacturing corporations, were at least not driven directly by them.

Needed: more healthy local food systems



Most food in the world is produced by cooperative, small and family farmers, with a natural interest in preserving the soil and the environment, and growing crops suitable in local climate and terrain. They need support and advice to improve what they know how to do, and to have access to higher levels of appropriate technology

Some of these projects are nefarious. The worst of its kind is also within the vitamin A area. This is 'golden rice', which had an overall US 50 million promotional budget for many years, likely decades, before it was ready for actual implementation. It is therefore probably the single most widely known nutrition programme, though it has yet to be routinely implemented anywhere. The answer can be seen in the genetically modified industry's response to every criticism levelled at it: 'What, you want to criticise and threaten this unique solution to a world hunger problem?'

Having worked for years with vitamin A and with conventional food fortification, I am convinced that golden rice will never solve any nutrition problem outside of situations in which people are given it free, or pressured into using it. Most people for whom rice is a staple are hesitant even to accept very minor changes in appearance caused by the less expensive conventional fortification technology (the addition of a small number of cold-extruded grains made from rice flour and nutrients, usually slightly off-colour). The enormous investment that would be required to get hundreds of millions of low-income consumers to switch to rice with a bright yellow colour (actually the colour rice gets when improperly stored and poisonously mouldy) would better be spent in poverty alleviation.

Perhaps the best example to date of a country that has largely eradicated hunger and malnutrition by way of government effort, rather than just by making economic progress, is Brazil. Its *Fome Zero* (Zero Hunger) programme of the past decade, among many other approaches, offers a monthly stipend, a conditional cash transfer, to all poor families. Moving cash into depressed areas works. All the nearby small businesses benefit hugely. The big companies quickly figure out what the poor want to buy, and gear up to sell it to them. Even the International Monetary Fund is starting to realise that recent evidence ‘tilts the balance towards the notion that attention to inequality can bring significant longer-run benefits for growth’ (25).

Helping poor people to eat more nourishing food does not require justification by proofs that this totally solves deficiencies of one nutrient for one group in the population. Justification for spending hundreds of millions of dollars in ways that distract from food-based programmes, certainly does require strong proof. Without such justification, such programmes should be phased out. Where the vitamin A capsule programme is demonstrably acting as a barrier and impeding fortification or other food-based programmes, then the phasing out process may need to be rapid.

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