

# HATiP

HIV & AIDS Treatment in Practice

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# HIV and malnutrition

## HIV and malnutrition

There is a growing recognition that HIV and malnutrition interact in complex ways that heighten vulnerability to and worsen severity of each condition. And while many national governments are scaling up HIV programmes, health ministries are seeking guidance on how to deal with a range of policy and programme challenges related to food, nutrition and HIV/AIDS.

To help address this need, WHO convened an interdisciplinary technical consultation a month ago in Durban, South Africa inviting more than two hundred scientists, clinicians, nutritionists, funders, government and CBO/NGO representatives to discuss the role of food and nutrition in HIV & AIDS management. Many participants stayed on for a second meeting immediately afterwards that addressed HIV/AIDS and Food and Nutrition Security, held by the International Food Policy Research Institute (IFPRI).

Although the focus of each meeting was slightly different — the WHO meeting was more concerned with developing evidence-based clinical nutritional guidelines, while the IFPRI meeting explored the various ways the HIV/AIDS epidemic interfaces with humanitarian and development issues surrounding food, nutrition and agricultural policy — both meetings recognised that in most of the world HIV spreads in the context of malnutrition and hunger, and that, in many locales, HIV/AIDS has in turn increased the incidence and severity of malnutrition as well as the likelihood of food insecurity both for the individual with the disease, as well as his or her family and, in some instances, the community in which they live.

The challenge for the participants of both meetings was to find how best to deal with both crises, and how to find appropriate solutions to equitably allocate resources in communities that are already poor and suffering.

## Macronutrients (protein, carbohydrates and fat) and HIV/AIDS

People with HIV and AIDS often eat less — most commonly because of a loss of appetite. In addition to underlying HIV, a number of opportunistic infections contribute to this by causing nausea, malaise, and fever. Infections, such as oesophageal candidiasis, that cause a sore mouth or pain from eating, also decrease food intake — and this may occur silently in children.

After an acute or severe episode of illness, appetite may improve and there is a chance to recuperate. The need for food at this time is greater, but people with HIV rarely have access to extra food when HIV occurs in a background of poverty and food insecurity.

Children and adults with HIV and AIDS may have even less access to food because of stigma or a decreased ability to provide food for themselves. Stigma may lead to job loss, or being cast out from the shelter of family or community. People also lose their jobs because they are too ill to work. Likewise, farmers who are ill may not grow enough food to feed themselves.

HIV & AIDS also redirects resources away from food to care. In some settings, people may have to choose between paying for medicine and paying for food. Caregiving can also divert other family member's time and energy away from employment or food provision.

## Changes in intake

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## Changes in absorption

Even when food is available, it may be poorly absorbed in patients with HIV and AIDS. Intestinal malabsorption and nutrient loss is common. While severe diarrhoea and malabsorption may be due to opportunistic infections or intestinal parasites such as cryptosporidiosis, some of the altered absorption appears to be a consequence of HIV infection itself. The virus has been shown to damage the intestinal villi, and inflammation can damage gut tissue and reduce absorption.

Frequently small bowel transit time is accelerated, particularly among children with severe diarrhoea. Enzymes in the intestinal mucosa involved with metabolism and absorption can also be less active.

These changes in the gut seem to affect the body's ability to utilise dietary fat and carbohydrates. A number of studies have reported that people with HIV have high levels of faecal fat that is unrelated to fat intake or, in one study in children, the presence of any intestinal infection other than HIV itself.

## Changes in metabolism

HIV infection (and replication) also affects metabolism in a variety of ways. Some of the metabolic effects may in fact be mediated by the body's inflammatory immune response, especially, Dr. Tomkins stressed, the production of cytokines. Cytokines are chemical messengers and growth factors produced by lymphocytes in the blood to help direct the inflammatory immune process. "These inflammatory responses begin as soon as a person is infected with HIV" said Dr. Tomkin's "and are important because they increase the nutrient requirements of the host."

As a result, among adults, there is a 10% increase in resting energy expenditure (or the resting metabolic rate/RMR). During opportunistic or inter-current bacterial infections, the increase in RMR may be even higher — around 20-30%. But, total daily energy expenditure may not change — largely because the ill are less physically active.

What happens in children is less clear — although measurements could be more difficult to take because they are more physically active and (should be) continually growing. However, any energy that HIV misdirects is likely to be more sorely missed in children because they require a higher proportion of energy for growth and development.

There are also endocrine/hormonal changes in patients with HIV and AIDS — such as hypogonadism, (reduced or absent of secretion of hormones from the sex glands). Testosterone levels in particular may be depressed accompanied by a substantial loss of muscle or lean body mass.

Patients who are ill normally lose fat stores first, followed by a loss of lean body mass. But in HIV infected patients, there are clear changes in protein synthesis and breakdown — both in the immune cells, liver and the muscle. Dr. Abiud Omwega of the Food and Nutrition Technical Assistance Project (FANTA) in Rwanda noted that, “HIV seems to induce a special metabolic effect involving a preferential loss of protein over fat.” After repeated episodes of loss of both fat and lean tissue, fat appears to be preferentially restored during recovery.

Measuring weight gain in people with HIV and AIDS without assessing body composition can give care providers a false sense of security.

The preferential depletion of protein has led some to suggest that people with HIV should include more protein in their diets. However, there is no clinical evidence to support increasing the proportion of protein above the levels required in a normal balanced diet (12 to 15% of the total energy intake).

Without controlling the underlying HIV infection, increasing the level of protein in the diet could even be harmful because it could fuel the inflammatory process. This occurs in other clinical settings. For example, administering total parental nutrition (TPN — when nutrients and vitamins are given intravenously — can lead to clinical deterioration in patients with sepsis.

Nonetheless, the WHO's technical advisory group on nutrition concluded there is ample evidence that people with HIV should increase their diets by at least 10% early in infection (to prevent weight loss) and by 30–50% during the convalescent period after a severe infection in order to achieve nutritional recovery.

## The impact of macronutrient deficiencies on HIV & AIDS

Underlying malnutrition is a major contributor to death from an illness, particularly for children under 5. Recent data demonstrates that this holds true in HIV disease & AIDS as well.

For example, in the recent CHAP (cotrimoxazole prophylaxis) study in Zambia, low weight for age or low weight for height were independently associated with a substantially increased risk of mortality (see Table 1).

Table 1: Weight and height measurements in CHAP study - Zambia

*Weight for age and weight for height are most important independent predictors*

	N (% died)	mRR	95% CI	p
<3rd cent weight-for-age	349 (44%)	2.1	(1.4-3.3)	0.001
<3rd cent height-for-age	403 (39%)	1.4	(0.9-2.1)	0.17

	N (% died)	mRR	95% CI	p
<3rd cent weight-for-height	116 (58%)	1.8	(1.3-2.5)	<0.001

Dr. Tomkins cited a second example from a study in Tanzania (Villamor et al., Int J Epidemiology, 34: 61-68, 2005) which examined risk factors for mortality in 687 children aged 6-60 months admitted to the hospital with pneumonia. Children were visited every 2 weeks for the first year and every 4 months thereafter for follow-up. Weight, height and mid-upper arm circumference (MUAC — a predictor of body mass index in children) were measured monthly.

Over the next two years, 90 children died. Risk factors for death included HIV infection, age below 24 months, stunting, low MUAC, anaemia and lack of a safe domestic water supply.

Malnutrition and food security are also risk factors for HIV infection. In addition to decreased immunity, there is an increase in sexual risk taking is also a factor. Hungry women and children are more likely to engage in transactional sex.

## Possible interventions

- **Anabolic steroids:** These promote anabolism (preservation and gains of lean muscle mass), improved physical functioning and quality of life, but their use in resource-limited settings is problematic because of cost and safety.
- **Exercise:** Resistance weight training has been shown to increase lean body mass in settings where patients have adequate nutrition, however, there have been no controlled randomised studies on exercise in resource limited settings.
- **Preventing and treating OIs associated with weight loss:** Dr. Tomkins noted one example in which a community in Kenya built water tanks to improve their water safety and prevent parasite infections. This led to a clear reduction in underweight children.
- **ART:** ART leads to weight gain in some people with AIDS but not all. Dr. Tomkins described a patient he'd seen in Lusaka who had been on antiretroviral without gaining any weight. When he saw her a few months later, she had put on about 6 kg. When he asked her what she had done differently, she told him that she had borrowed money to buy more food. “Antiretrovirals need food,” said Dr. Tomkins “if they are to have their best effect.”
- **More food:** As noted above, WHO's TAG on nutrition has concluded that people with HIV should increase their food intake, particularly during recovery periods. However, Dr. Tomkins said, “it is not possible to ‘force the pace’ of nutritional recovery while the infection is present. Antiretrovirals, on their own, are not enough — nutrition, on its own, is not enough.”

Still there is little data on the effect of increasing food provision to selected patients in poor countries. Likewise, even though there are strong theoretical grounds for improving food security in the home, clinicians and policy makers need more data about the most effective interventions.

According to Dr Tomkins: “There are key questions to be answered if we are to know what really works to improve survival and outcome in HIV/AIDS. Good theories do not necessarily provide an evidence base for good practice. We would like to see greater attention to documenting [the effects of various nutritional interventions].”

Nevertheless, Dr Tomkins said “there is already enough knowledge for us to begin improving management now.”

Dr Omwega concurred with recommendations that people with HIV and AIDS should increase their dietary intake, but he stressed that it is difficult to identify “locally appropriate, sustainable ways of increasing dietary intake.” Researchers and clinicians in resource-limited settings also need “simple practical ways to assess nutritional status and related outcomes in patients with HIV/AIDS before and during treatment,” he said.

“But what should we feed them?” said Dr Beatrice Amadi, a paediatrician and consultant for the University Teaching Hospital, in Lusaka, Zambia. She also voiced concerns about the financial implications both to the individual and, possibly, health systems. “Where is the extra food going to come from?” she said. “If the adults are still working, are they earning enough to increase their food intake? What if they are not working? What about orphans and other vulnerable groups. (more of Dr Amadi’s comments and others deliver improved nutrition in the field will be in the next HATIP).

## Micronutrients (vitamins and minerals) and HIV Infection

In addition to food, people with HIV may need additional micronutrients. The same cycle of malnutrition and infection (see figure 1) that occurs with macronutrients is seen with micronutrients as well. People with serious infections or diseases, may have altered intake, absorption and metabolism of various micronutrients. These deficiencies in turn can weaken the immune system and increase the risk of infection.

Micronutrient supplementation can improve health — for example, vitamin A supplementation reduces mortality from a variety of causes in children under 5. Moreover, vitamin and minerals can be relatively easy and inexpensive to administer — but they should not be seen as a magic bullet.

In fact, the effects of micronutrient deficiencies and/or supplementation on HIV disease are complex according to Professor Henrik Friis of the Institute of Public Health Science at the University of Copenhagen, Denmark. He told the audience at the WHO meeting of a variety of methodological problems that make designing or deciphering vitamin and mineral studies difficult.

HIV infection increases a person’s requirements for a number of micronutrients, “but,” said Dr. Friis “the magnitude of the effect of HIV on micronutrient status or requirements depends on 1) the micronutrient in question, 2) the stage of HIV infection — it is clear that the effect increases as the patient becomes more symptomatic — and 3) the [patient’s] access to care and treatment of the common opportunistic infections and HIV”.

There is clear evidence that micronutrient status affects both susceptibility to and progression of HIV infection as well as general health, pregnancy outcomes, growth in children, etc. Micronutrients also interact with drug therapy, affecting the bioavailability, effectiveness, and/or safety of medicines.

In severe cases, micronutrient deficiency leads to a complex known as NAIDS or nutritionally acquired immunodeficiency syndrome — which, like AIDS, increases susceptibility to secondary infections. In a person with HIV, NAIDS may contribute to CD4 cell decline and increase the risk of progression to AIDS and death. In addition, poor micronutrient status also leads to oxidative stress, which has been directly shown to increase HIV replication — potentially speeding progression.

Much of the data on micronutrients and HIV and AIDS has been based on observational studies — but their findings are not always reliable. For one thing, it is difficult to assess micronutrient intake in these studies. “People don’t remember what they have been eating

and they report it inaccurately,” said Friis. In addition, it is difficult to study just one micronutrient on its own because bioavailability may depend on intake of other nutrients. Also, biomarkers used to measure nutrient status in the blood are not always trustworthy when there is an infection in the patient.

As a result, there’s a potential for “bias and confounding that leads to spurious associations,” said Dr. Friis. As an example, he noted a vitamin study in Malawi a decade ago that caused considerable concern when it suggested that low serum retinal (a biomarker for vitamin A) was associated with a higher rate of mother to child transmission (MTCT). This led to a number of vitamin A supplementation studies that failed to show any positive effect on MTCT (see below). Dr. Friis said there were a number of other possible explanations for the Malawi findings.

“We cannot base our recommendations on observational data,” said Dr. Friis. “Recommendations have to be based on randomised controlled trials that show cause and effect.” But there are some limitations even for randomised controlled trials when investigating the role of micronutrients in HIV and AIDS. For example:

- The effects of the intervention depends on background intake
- The intervention may not be effective at fixing the deficiency
- Micronutrient deficiencies co-exist
- Micronutrients interact, for example:
- Micronutrients interact with other factors
- especially likely in those with low intake
- the typical cereal-based diet consumed in resource-limited settings is low in several micronutrients
- infections increase requirement of several micronutrients
- Intake of one reduces absorption of another: zinc-iron
- Intake of one increases excretion of another: zinc-copper
- Deficiency of one impairs metabolism of another:
- High intake of one changes requirements of another
- Copper deficiency leads to iron deficiency anaemia
- Zinc deficiency leads to vitamin A deficiency
- Vitamin C reduces requirements of vitamin E
- Vitamin C increases absorption of iron
- Iron may increase requirement of C, but make it harmful

As a result, data from several RCT may be needed before making any recommendations for micronutrient supplementation. Dr. Friis reviewed what has been published on the interaction between HIV disease and iron, selenium and zinc.

## Iron

Background: Iron deficiency is one of the most common nutritional deficiencies in resource limited settings. Supplementation to prevent or treat anaemia is widespread in populations where HIV prevalence is high. But sometimes iron supplementation can be harmful.

Iron is important to the host but it can also be important to the pathogen. In fact, the human body has very potent iron withholding mechanisms to keep from stimulating the growth of the invasive organisms. Thus, iron supplementation can actually increase



infectious disease risk - which has been observed in some malaria, diarrhoea and TB studies.

In HIV, the data are contradictory. In vitro, studies suggest that iron supplementation increases viral replication. HIV may initially reduce iron status, but later lead to iron accumulation. Observational data suggests that iron can increase HIV progression. However, Dr. Friis performed a reanalysis of a randomised control trial of iron supplementation in Kenya that found that low dose iron (60 mg twice weekly) had no effect on viral load (see Table 2). But the issue has not really been resolved - there remains an urgent need to establish the effect and safety of iron supplementation in the doses that are commonly given to prevent and treat anaemia.

Table 2: Iron and HIV infection

*Randomised trial in Kenya, reanalysis*

*Low dose iron supplementation (60 mg twice weekly)*

	Placebo (n=23)	Iron (n=22)
Age (y)	26.9	27.7
Male sex	7	5
Serum ferritin	10.4	8.1
Haemoglobin	115	113
HIV load		
baseline	4.93	5.57
4 month	4.21	4.71
-	-0.59 (-0.95, -0.24)	-0.83 (-1.20, -0.47)

Low dose iron supplementation did not increase HIV load Olsen A, JAIDS, 2003

## Zinc

Zinc is essential for growth and synthesis of lean body mass and for a healthy immune system. However, if the given dose of zinc is too high, it can be immunosuppressive.

In children, zinc supplementation of children reduces complications from diarrhoea, pneumonia and malaria. In people with HIV, it should theoretically be beneficial.

Then data from the Multicenter AIDS Cohort Study (MACS) in the US suggested that zinc intake 30% above RDA is associated with a higher rate of HIV progression and death. But levels of zinc in the American diet are very high so the MACS data are not really generalisable to populations with low intake of zinc, such as in Africa.

More research needs to be conducted in settings where there zinc deficiency and HIV prevalence is common to determine the optimum required daily allowance (RDA), and the dose needed to improve HIV and non-HIV outcomes.

There was a small study in Zambia in which 106 HIV+ adults with persistent diarrhoea received 200 mg of zinc and other micronutrients for 2 weeks. It found no effect on morbidity over 12 weeks.

More recently, a few South African studies have reported that zinc supplementation is safe in HIV-infected children and does not increase HIV viral load or reduce CD4 cell count.

In one placebo controlled study at GreysHospital zinc supplementation (zinc sulphate 10 mg /d) significantly reduced frequency of watery diarrhea, and there was a trend toward reduced frequency of pneumonia in children. The most recent RCT found a

significant reduction in serious adverse events (hospitalizations) in children receiving zinc (3 mg/kg/day).

## Selenium

Selenium is important for the immune system. In vitro studies suggest that selenium deficiency increases HIV replication. Observational studies, including one in 949 pregnant Tanzanians, suggest that low serum selenium is a predictor of mortality in people with HIV. But there is little clinical data to show that supplementation reduces the risk of transmission.

In one study in the US, 186 adult patients were randomised to receive, 200 g selenium per day for two years. Those taking selenium had a lower hospitalisation rate, but the effects on HIV load or other HIV outcomes have not yet been reported. In a more recent, randomised controlled trial in Kenya, 400 non-pregnant women received 200 g selenium plus a multivitamin daily for 6 wks. There was no effect on viral load but CD4 counts increased. However, the researchers also reported an increased risk of genital HIV shedding. But it is impossible to say whether any of this was due to selenium.

## Vitamin deficiency and supplementation in HIV and AIDS

Dr Gernard Msamanga of Muhimbili University, Dar es Salaam, Tanzania reviewed the published data on role of vitamins in HIV disease. He focused on vitamins effects on HIV disease progression, mortality in adults and children, improvement of surrogate markers (reducing viral load, improved CD4 and CD8 counts and finally on pregnancy outcomes (foetal deaths, low birth weight and prematurity).

## Vitamin A

Vitamin A is very important to immune function, particularly in pre-school children, preventing infection and mortality. However, in vitro data suggests that vitamin A has a complex interaction with HIV: the effect of vitamin A during HIV varies dichotomously depending on timing of infection and exposure to the vitamin.

Because of the Malawi study, there were hopes that Vitamin A might reduce MTCT — but this has not been born out clinically. In fact, two randomised studies found no affect on mother-to-child transmission, and a study in Tanzania reported that vitamin A *increased* the risk of mother to child transmission by 38%.

The recently finished ZVITAMBO (Zimbabwe Vitamin A for Mothers and Babies Project) study (in 14,110 mother-baby pairs) concluded once and for all that vitamin A does not reduce MTCT .

But ZVITAMBO is now the third study to show that vitamin A supplementation reduces diarrhoeal illness and mortality in children under five infected with HIV (ZVITAMBO extends this finding to patients under 6 months of age *known* to be infected). Because of some unexpected findings the jury is still out about the effect of vitamin A on HIV-exposed infants who are not-yet infected.

The role of Vitamin A supplementation in adults with HIV is also unclear. In one study in in Tanzania, some of the benefit of anti-oxidant vitamins (see Table 3 and below) disappeared when vitamin A was also given to patients.

Table 3: Effect of Three Vitamin Regimens on T Cell Counts Compared to the Placebo Group

	Difference	P
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<b>Whole Period</b>	Mean (SD) in Placebo Group	449 (255)
<b>Multivitamins B, C and E</b>	48 (10, 85)	0.01
<b>Multivitamins and Vitamin A</b>	41 (4, 77)	0.03
<b>Vitamin A alone</b>	-15 (-45, 14)	0.30
<b>First Two Years</b>	Mean (SD) in Placebo Group	494 (257)
<b>Multivitamins B, C and E</b>	48 (18, 79)	0.002
<b>Multivitamins and Vitamin A</b>	21 (-11, 53)	0.20
<b>Vitamin A alone</b>	-16 (-44, 13)	0.28
<b>First Four Years</b>	Mean (SD) in Placebo Group	470 (254)
<b>Multivitamins B, C and E</b>	38 (8, 68)	0.01
<b>Multivitamins and Vitamin A</b>	19 (-12, 50)	0.22
<b>Vitamin A alone</b>	-18 (-46, 11)	0.22

NEJM 2004;351:23-32

## Vitamins B, C and E

A number of observational studies suggest that vitamins B, C and E, all potent antioxidants, are associated with a reduced risk of HIV progression. One small study reported that vitamin C and E had an effect on viral load, though the study was too small to show statistical significance. A large randomised controlled study in Tanzania showed that pregnant women who took a multivitamin supplement containing 3 to 10 times the RDA of six B vitamins and vitamins C and E reduced the risk of poor pregnancy outcomes, mother to child transmission, and progression to AIDS and death (see Tables 4/5/6).

Table 4: Effect of Three Vitamin Regimens on Viral Load Compared to the Placebo Group

Viral Load (log 10)

	Difference	P
<b>Whole Period</b>	Mean (SD) in Placebo Group	4.67 (0.86)
<b>Multivitamins B, C and E</b>	-0.18 (-0.32, -0.03)	0.02
<b>Multivitamins and Vitamin A</b>	-0.07 (-0.21, 0.09)	0.40
<b>Vitamin A alone</b>	-0.03 (-0.17, 0.11)	0.68
<b>First Two Years</b>	Mean (SD) in Placebo Group	4.59 (0.86)
<b>Multivitamins B, C and E</b>	-0.18(-0.34, -0.03)	0.02
<b>Multivitamins and Vitamin A</b>	-0.11 (-0.27, 0.05)	0.17
<b>Vitamin A alone</b>	-0.07 (-0.23, 0.08)	0.35
<b>First Four Years</b>	Mean (SD) in Placebo Group	4.65(0.86)
<b>Multivitamins B, C and E</b>	4.65(0.86)	0.01

<b>Multivitamins and Vitamin A</b>	-0.09 (-0.24, 0.06)	0.24
<b>Vitamin A alone</b>	-0.04 (-0.18, 0.10)	0.57

Table 5: Effect of Multivitamin Supplementation on Foetal Deaths

Outcome	Multivitamins n (%)	No Multivitamins n (%)	RR (95%CI)	P
<b>Miscarriage</b>	<b>12 (2.3)</b>	<b>18 (3.5)</b>	<b>0.66 (0.32 - 1.36)</b>	<b>0.26</b>
<b>Stillbirth</b>	<b>18 (3.5)</b>	<b>31 (6.1)</b>	<b>0.58 (0.33 - 1.02)</b>	<b>0.05</b>
<b>Fetal death</b>	<b>30 (5.9)</b>	<b>49 (9.6)</b>	<b>0.61 (0.39-0.94)</b>	<b>0.02</b>

Fawzi, Lancet 1998;351:1477

Table 6: Effect of Multivitamin Supplementation on Pregnancy Outcomes

Outcome	Multivitamins n (%)	No Multivitamins n (%)	RR (95%CI)	P
<b>Low Birth W (&lt;2500g)</b>	36 (8.8)	62 (15.8)	0.56 (0.38-0.82)	0.003
<b>LBW (&lt;2000g)</b>	7 (1.7)	16 (4.1)	0.42 (0.18-1.01)	0.05
<b>Preterm (&lt;37wk)</b>	96 (21.1)	106 (24.5)	0.86 (0.68-1.10)	0.23
<b>Preterm (&lt;34wk)</b>	28 (6.2)	44 (10.2)	0.61 (0.38-0.96)	0.03
<b>SGA</b>	39 (10.0)	66 (17.6)	0.57 (0.39-0.82)	0.002

## Multimineral supplementation

In one study in Thailand, 481 HIV positive adults were treated with a multimicronutrient supplement or placebo for 48 weeks. The supplement contained: zinc 30 mg, iron 10 mg, selenium 0.4 mg, copper 3 mg, iodine 0.3 mg, chromium 0.15 mg, manganese 8 mg, magnesium 80 mg, plus vitamins A, B-complex, C, D, E, and K. There was a 50% reduction in mortality among those on the supplement. This finding was not statistically significant for the whole population (RR 0.53 (95% p=0.10)) but it was for those with lower CD4 cell counts: below 200 (RR=0.37, p=0.05), below 100 (RR 0.26, p=0.03)). The study found no effects on viral load and CD4 count.

## Summary

Multimicronutrient supplements can improve various clinical outcomes among HIV-infected individuals, especially in patients with specific micronutrient deficiencies. But they are not always beneficial and are certainly no-cure all.

Further research is needed to examine the efficacy of multivitamin supplements on reduced disease progression and mortality among those on ART and among children, as well as what doses and combination of nutrients work best for people with HIV. The combination and doses may need to be varied by stage of HIV

disease, baseline micronutrient status, and the non-HIV related nutritional needs for a population's health.

Finally, while micronutritional supplements might be simple to administer, attendees stressed that the best source of micronutrients is from a complete and well-rounded diet. How to improve access to improved nutrition in resource limited settings to those at risk or infected by HIV will be the subject of the next HATIP.

## References

Fawzi W et al. Studies of Vitamins and Minerals and HIV Transmission and Disease Progression. *Journal of Nutrition* 35:938-944, 2005.

### Stories Associated with the WHO and IFPRI Meetings on AIDSMAP

[WHO Consultation on food security and nutritional needs of people living with HIV/AIDS opens in Durban](#)

[WHO consultation presents comprehensive overview on nutrition & HIV](#)

[South Africa's health minister "feels vindicated" by nutrition & HIV/AIDS conference in Durban](#)

[Vitamin profiteer and AIDS-denialist misleading South Africans, says WHO/UN](#)

[Effects of malnutrition on safety and success of ARVs still unknown, says US expert](#)

[WHO Technical Consultation on Nutrition and HIV/AIDS highlights food crisis](#)

[Food insecurity fueling spread of HIV/AIDS while HIV/AIDS increasing food insecurity, experts say in Durban](#)

[Expert says HIV drugs give only 5-10 year window to come up with new ways to beat AIDS in Africa](#)

### Other Resources:

[http://www.sahims.net/doclibrary/Sahims\\_Documents/Participants\\_statement\\_final\\_draft.pdf](http://www.sahims.net/doclibrary/Sahims_Documents/Participants_statement_final_draft.pdf)

[http://www.sahims.net/archive/who/archive\\_who\\_consultation.htm](http://www.sahims.net/archive/who/archive_who_consultation.htm)  
[http://www.sahims.net/archive/archive\\_hiv\\_aids.htm](http://www.sahims.net/archive/archive_hiv_aids.htm)

[http://www.sahims.net/doclibrary/Sahims\\_Documents/Recommendations/Nutrient\\_Req\\_AIDS.pdf](http://www.sahims.net/doclibrary/Sahims_Documents/Recommendations/Nutrient_Req_AIDS.pdf)

Gillespie S and Kadiyala S. HIV/AIDS and Food and Nutrition Security From Evidence to Action. International Food Policy Research Institute, 2005. Copies of this book and other related materials may be downloaded from the IFPRI site: [www.ifpri.org](http://www.ifpri.org).

## about HATIP

A regular electronic newsletter for health care workers and community-based organisations on HIV treatment in resource-limited settings.

The newsletter is edited by Theo Smart (Cape Town) and Keith Alcorn, NAM's Senior Editor (London).

For further information please visit the HATIP section of [aidsmap.com](http://aidsmap.com)