Indigenous methods of food preparation: what is their impact on food security and nutrition?

Collection of contributions received

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Introduction to the topic

Dear FSN Forum members,

I am very happy to be the facilitator of this online discussion on indigenous methods of food preparation. I must highlight that this forum held an interesting previous discussion on how indigenous knowledge systems can be used to improve agricultural productivity and food security among rural poor communities. However, we did not touch on how communities use this knowledge that is passed from generation to generation to prepare their food and the possible implications on the socio-economic dynamics of a typical rural household.

Let me start by introducing myself. My name is Edward Mutandwa and I am a graduate research assistant at Mississippi State University's College of Forestry in the US. I have previously worked in Rwanda at the Higher Institute of Agriculture and Animal Husbandry (French acronym ISAE), a public institution focusing on improvement of rural livelihoods. During that time I had the opportunity to work with rural communities and this current topic emanates from those experiences. I have also personally seen how some methods like using grass, soil and ash can be useful in preserving sweet potatoes (article in African Studies Quarterly, Vol. 9, No 3, 2007 http://www.africa.ufl.edu/asq/v9/v9i3a4.htm ). Before going any further, it is important to define indigenous knowledge. It is the knowledge that is unique to a given culture and provides a basis for local-level decision making in agriculture, health care, food preparation, education, natural-resource management, and a host of other activities in rural communities (Warren 1991, Flavier et al 1995, , Kolawole, 2001, Maikhuri, et al, 1999). Unfortunately, this knowledge is usually not taken seriously as a viable alternative for ensuring food security and nutrition. Many people rely on methods based on the scientific approach and thus IKS may be at the verge of extinction.

Rwanda is a small country in East Africa which has experienced tremendous strides in the areas of agricultural and food security. At the same time, culture and tradition still remain vivid aspects of their day to day lives. There are some very popular foods like “isombe” which is prepared from cassava leaves. However, one thing that is striking about this delicacy is the seemingly high opportunity cost of time that women spend preparing it. It can actually be prepared for 5 or more hours (grinding) and then an extra 2 to 3 hours of cooking. There are other food classes in the same category. This has several implications on household socio-economic setup. First, since food preparation is done by women, the amount of labour time available for other activities in the household is limited. Since the household operates under constrained optimization conditions, what can be done to ensure efficient use of limited labour resources? Secondly, after spending so much time from grinding leaves to cooking, it is not clear whether the nutritional content is maintained or reduced. Third, it would be interesting to see if there are any formalized studies carried out to determine the nutritional contents of foods prepared in an indigenous way.

Let me state the questions of interest more formally:

More broadly can we consider indigenous methods of food preparation as a viable means for achieving food security and nutrition in rural poor communities? I am specifically interested in hearing from the diverse base of FSN Forum members on the following issues:

1. Are there any lively examples of indigenous methods of food preparation and how do they influence food security and nutrition? Formal published research will be welcome on this point
2. What informal strategies have been put in place by local communities to ensure that this knowledge is not lost?
3. What is the perception of formal public institutes in your country towards integrating IKS in food preparation programs? Are there any opportunities for modifying some methods for example for child nutrition based programs?

4. If indeed indigenous methods are important, what can governments do to create incentives for their continued use?

I would like to thank you in advance for taking your time to participate in this discussion.

Edward
Contributions received

1. Gill Shepherd, IUCN, United Kingdom

One interesting way to look at what is maintained and what is lost as indigenous methods of food preparation (and indigenous foods) adapt to changing circumstances is to look at what happens with urbanisation. As time becomes shorter and cooking fuel has a cash-cost rather than a time-collection-cost, some foods are abandoned, and many are maintained but their preparation method changes (often with the help of the market): so maize is ground into maizemeal instead of boiled whole (East Africa); brown beans are cooked in bulk commercially and sold hot in the street instead of prepared at home (Nile Valley); wheat grains are pre-broken or semi-cooked as with bulgur or couscous in North Africa and the Middle East. Whole new dishes are invented with the fermentation of soaked lentils (which speeds up cooking time) in the Indian sub-continent.

I have seen cassava leaves prepared in a far less time consuming way in the Comoro Islands than is described for Rwanda, in part by shredding the leaves before cooking.

The ultimate way of cooking in a fuel-short context is chinese cooking, where dishes are prepared by spending most of the time on cutting portions up into very small pieces which will cook rapidly. It is then possible to stir-fry or boil the vegetables and meat (if any) in as little time as it takes to cook the rice.

All these methods are indigenous methods too, as additional constraints kick in.

I am glad the moderator [Edward Mutandwa, Ed.] includes indigenous methods of food storage among his concerns. They are very important and not always well understood. The drying of foods such as green leaves, vegetables and fruits is very important in some areas and so is pickling in Asia and Europe.

2. Gerardo Enrique Paniagua Rodríguez, Farmersdialogue.org, Costa Rica

[Original contribution in Spanish]

En Costa Rica los hermanos indígenas consumen muchos productos de raíz como yuca, ñanpi, tiquizque en sopas o verduras acompañados de carnes, las ensaladas no pueden faltar, mezclan tomates o coles con las flores del Itabo, o las flores del Poró de las cuales se come tan solo la parte externa ya que la interna contiene un fuerte veneno, las frutas como la guayaba, la arazá, los limones, naranjas, mandarinas no pueden faltar, estos productos se adicionan al arroz. Los frijoles, el platano o banano cocinado acompañado de aguadulce o de un vaso de chocolate caliente, en algunas regiones se acostumbra mucho las tortillas de maíz blanco, los elotes tiernos cocinados en caldo de huesitos de res o algún animalito silvestre como el tepescuintle, la tortuga o un delicioso pescado.

[Translation in English]

In Costa Rica, the indigenous population eats many tubers such as cassava, nampí or tiquizque in soups or accompanied by meat. Salads are a must, mixing tomatoes or cabbage with Itabo (yucca flower), or Poró flowers, of which only the outside part can be eaten, as the inside contains a strong poison. Another must are fruits like guava, arazá, lemons, oranges, tangerines, usually mixed with rice. We can also mention beans, cooked plantain or banana accompanied with aguadulce (hot sweet drink) or by a glass of hot chocolate. In some regions people enjoy white corn tortillas, sweet corn cooked in a broth of beef tender bones or some wild animal as the tepescuinte (or paca, a wild rodent), tortoise or some delicious fish.
3. Hamid Ahmad, Pakistan Society of Food Scientists & Technologists (PSFST), Pakistan

About 3 decades ago a process of development of Appropriate Technologies entities in most of the developing countries was initiated. It often included the food and nutrition sector. It was an highly positive direction for researchers to tap and use processes and technologies based on traditional wisdoms and to filter or polish these for more effective use in policy making mechanisms. Slowly the entities may have faded away and now coming up with different nomenclatures. So, surely the approach has a weight of knowledge base and traditions to fit in more appropriately in development countries. I would like to reinforce this line of approach and further action.

4. KV Peter, World Noni Research Foundation, India [first contribution]

The most popular and most cherished indigenous method of food preparation is the one by mamma (mother) and grandamma (grandmother) based on the likeness and preferences of family members. Culinary preferences, availability of raw materials, and above all zero wastage are the characteristics of such diets. Special diets are served fresh and hot to the disabled members. A documentation of such indigenous foods will be welcome.

Dr K V Peter

5. Robert A Best, West Indian Projects, Trinidad and Tobago

Edward

This is a very interesting set of questions.

Let me add another dimension which addresses another dimension of food security .. the ability to earn income from indigenous foods.

In much of the Caribbean (CARICOM) incomes are growing so most of our countries are no longer low income. And as incomes grow, urbanization quickens, more women work and access to international communication grows tastes and food eating patterns are changing. Women don't have the time to cook indigenous foods and young people are more interested in international fast food and snacks.

So the food import bill is growing, not of foods which compete with our foods and less is being bought from our farmers in rural communities. The challenge is how to transform the indigenous food preparation and cooking processes into one that meets the needs of urban consumers. The Trinidad and Tobago Agribusiness Association has addressed this by processing tropical roots (and other F&V) into frozen, cubed, packaged and branded product which urban house wife and young people who no longer can select quality roots in the fresh markets can conveniently purchase together with their groceries. Also they have introduced dried root crops into mixed flour breads. See http://www.ttaba.com/products.htm Based on this increased demand they are able to increase volumes with contract farmers.

In addition, indigenous foods create a powerful platform for branding especially for exports as is seen in Jamaican pepper and jerk sauces which are leading the explosive growth of ethnic foods in the UK and creating a demand for raw peppers in the rural communities of Jamaica.

So improving the productivity of preparing indigenous food in households but by extension in SME processing operations can be an important way of improving food security, in rural households,
urban households and through exports, increase the demand for local products from farming communities.

Trust you find this useful

Robert

6. Edward Mutandwa, Mississippi State University (MSU), United States of America [first comment]

Hello FSN members,

Thank you very much for the interesting contributions made so far. There are about three themes emerging hitherto. First, is that some indigenous methods of food preparation have disappeared mainly because of urbanization (Gill, and Robert). I certainly agree on this point because the more a society becomes urbanized, the more they are exposed to fast foods and the less likely they will continue to eat indigenous food. Constraints include high fuel cost which creates as disincentive for some people but could be reduced for example by shredding leaves (Gill). Secondly, members agree that indigenous foods will remain important as long as they are adapted to a changing environment characterized by dynamic tastes and preferences. Therefore, the main issue is how to add value (Robert and Ahmad) through appropriate technologies. Third, KV Peter indicates that most of the food is prepared by "mama and grandmother" and so they represent an important source of information related to food preparation. But how do we ensure that their knowledge is passed on to future generations? Finally, a very important issue highlighted by Robert is the need to exploit branding opportunities in export markets. Tell us more about your local foods. I really appreciate your comments and hope to recieve more suggestions from you!

Regards,
Edward

7. Laura Pereira, University of Oxford, United Kingdom

Edward, I wanted to thank you so much for bringing this important topic up for discussion- I think we can learn a lot about increasing food security by focussing on indigenous knowledge. I’m currently working on a project that focusses on innovation for underutilised and ‘orphan’ crops in SSA with a specific focus on the types of dishes and even products can be developed that can benefit local food security as well as increase livelihoods and income for the farmers growing or harvesting these foods. A very interesting element is what Gill mentioned regarding the increase in urbanisation and a shift towards more Western diets, which is resulting in health implications, loss of knowledge about these crops, how to eat them and also the agro-biodiversity that they bring to the system.

My current focus is on cassava in Nigeria- and the case of cassava bread that is a new 'technology' being promoted by the government as a type of import substitution policy for wheat flour. During this research I've become fascinated with the different types of cuisine that involve cassava- from its native Latin America, across different regions of Africa through to South-East Asia. What’s even more interesting is the nutritional aspect that you mentioned- cassava is a great source of carbohydrates (once it is prepared post-harvest to get rid of its cyanide content), but it is severely lacking in protein. However, the leaves contain a high protein content and it's interesting that many cooking practices in Central and East Africa (as you mentioned) involve using the leaves in food preparation. The 'markets' for these products, however, remain at the village or household level, whereas in West Africa there is a much larger industry for processed cassavatubers in the form of
fufu and garri. Latin America and Brazil in particular lies at the other extreme where cassava is very much a part of the formal market and varieties of cassava based products exist—whether it's the street food from Minas: Pao de queijo, farofa or even poviho that is made from very fine cassava flour.

Thus I think an important aspect for increasing nutritional benefits in urban environments as well as for maintaining local culture and encouraging agro-biodiversity that a focus on indigenous knowledge in food preparation is key. However, the next step needs to be taken for it to become successful in the market—whether through processing of the products making them easier to store and less time-consuming to make or whether it requires more of an education and marketing campaign taken on by, for example, a celebrity chef.

I'm interested to hear what you find out in your project—as you can see this is a topic close to my heart!

8. Francisca Mwanda, Zambia Agricultural Research Institute, Zambia

Good day,

I would like to first start by introducing myself. My name is Mwanda Francisa. I work at the Zambia Agricultural Research Institute in Zambia as a research scientist. I got this information from a friend who is a forum member and I thought the topic was very interesting and therefore thought I could contribute.

* Can we consider indigenous methods of food preparation as a viable means of achieving food security and nutrition in rural poor communities?

Firstly my answer to the above question is yes and no. Let me elaborate

Some methods of indigenous food preparation involve too much boiling which in the end reduces the nutritional value of the food. If for example we take vegetables such as cabbage, it is normally recommended that it is taken raw to ensure the realization of all its nutritional benefits (roughage, vitamins etc). However in most rural homes, this vegetable is boiled and this causes it to lose its nutritional value, thereby making it less nutrition and not adding to the general food security of a household. So in this particular case, an indigenous food preparation method fails to result in nutrition and food security.

Some methods of food preparation include a component of long term food preservation which is very important in maintaining nutrition and food security of poor rural households. Poor rural households usually do not own refrigerators or other preservation instruments to preserve food. They have come up with methods of preservation that have been passed on from generation to generation. A good example is preservation of cooked sweet potato chips providing nutrition and adding to household food security.

1. Are there lively examples of indigenous methods of food preparation and how do they influence food security and nutrition?

I will echo the example I gave above where a particular preparation method also includes preservation. Sweet potatoes are washed and boiled. A pinch of salt may be added to enhance the taste, however this is optional. The cooked sweet potatoes are then sliced to make chips and dried. These dried chips can be taken even after six months. In Zambia they are normally referred to as 'Shilengwa or Insemwa'. These potato chips are are high in caloric nutritional value and their ability to last long is a plus to food security. Many rural poor communities have caloric deficiencies
in Zambia so food preparation methods that include preservation are very important. (Reutlinger S
and Alderman H, Prevalence of caloric-Deficient diets)

2. What informal strategies have been put in place to ensure this knowledge is not lost?

In my culture, such information is passed on from generation to generation by the family elders. In
my case, my grand mother taught me how to prepare Insemwa or Shilengwa and I hope to also
teach my children.

3. What is the perception of formal public institutes in your country towards IKS in food preparation
programs? Are there any opportunities for modifying some methods for example for child nutrition
based programs?

The perception in my work place an Agricultural research institute is that IKS are important and
they can be used in certain cases to improve agricultural production. Opportunities for modifying
some methods are indeed plenty.

4. If indeed indigenous methods are important, what can governments do to create incentives for their
continued use?

Governments can begin with creating awareness on some of the methods highlighting their benefits
to society through different ministries as well as public media. Institutions that have a good
understanding of the methods could also take it up to train trainers who will also train those who
may not know the methods.

Thank you.

9. Carla Mejia, United States Pharmacopeia, United States of America

Thanks so much Edward for bringing up this topic.

The UNDP report hat summarizes the food security policy context in Brazil, has a good summary of
the three elements that have been found to be basic for the development and implementation of
programs that target food security and nutrition of indigenous groups: 1) policy frameworks and
subsequently budgets that enable programs to be created, 2) multi-sectorial participation that
allows input and discussion of the guidelines and priorities and 3) adequate monitoring and
evaluation of the programs and/or policies (ref: http://www.ipc-

This type of approach has served to the development of various initiatives that have in fact applied
technology and practices typical of the indigenous populations like the program that assessed the
use of terraces recuperation in Peru (http://www.iadb.org/en/projects/project-description-
title,1303.html?id=pe-t1165#doc), and has also prompted the characterization of various crops
traditionally used by indigenous communities in the Andean region
(http://www.rlc.fao.org/es/agricultura/produ/cdrom/contenido/libro10/home10.htm ,
http://www.fao.org/docrep/017/aq287s/aq287s.pdf). However, the long term effects of these
initiatives has been proven to be not as successful as expected as chronic malnutrition and water
and food borne diseases are still highly prevalent in indigenous populations of Latin America,
especially in children. Moreover, the focus has been on 1) primary production 2) characterization
solely at a gastronomic level
(http://www.fao.org/fileadmin/templates/aiq2013/res/es/recetarioandino.pdf), and 3)
transformation of the crop at the semi industrial scale through the development of processed foods
that could be consumed by a majority (http://www.rlc.fao.org/pt/projetos/forsandino/). The
actual indigenous preparation practices and its effects on the subsequent potential nutritional value
has not been well characterized nor assessed; nor has been assessed the meaning of these preparations for the populations identity and preservation.

10. Edward Mutandwa, Mississippi State University (MSU), United States of America [second comment]

Dear Forum members,

Once again, I would like to thank you for your contributions. The centrality of the market mechanism in shaping the role of indigenous foods has been emphasized by experiences from West Africa, Brazil and Costa Rica (Gerardo). However, the forces of urbanization and Western diets are likely to result in loss of local knowledge. Laura highlights that markets for products such as fufu, garri and cassava are still rudimentary in West Africa. She reiterates the need for education for example through the use of celebrity chefs to train local communities about indigenous food preparation methods. Other other hand, Francisca from Zambia observes that too much boiling results in loss of nutritional value for instance in cabbages. This was also pointed out by Gill earlier on. Francisca further suggests that elders are important in the transmission of local knowledge from generation to generation (KV Peter). Carla refers to a multisectoral approach which is encapsulated in the UNDP report for Brazil. An interesting aspect of this discussion are the different types of foods including garri, fufu, sweet potato chips, cassava bread and a different array of fruits and the interesting methods of food preparation. Francisca indicated that sweet potato chips are sliced, salted and dried. This can take up to six months and therefore provide an important strategy for alleviating transitory food shocks that households face during the dry season. Although it seems that public institutions are supportive of efforts to promote indigenous food preparation methods, do you have any experiences of any legislative frameworks created in this regard? Another related aspect to this discussion is the role of insects in the food security because most are prepared using locally known methods of preparation (FAO report).

Thanks and well appreciated,
Edward

11. JS (Pat) Heslop-Harrison, University of Leicester, United Kingdom

Yeasts and Bacteria. Indigenous methods for food preparation are important. Can I ask for an important aspect of food preparation to be considered in responses: how are yeast and bacterial cultures maintained and treated? Their nature and quality are of course critical to breads, beers, yogurts and cheeses, with impact on digestibility, uses, and safety of foods. There is usually involvement of local strains, perhaps not formally cultured but carried to the food product from skin, earthenware or leather containers, or the local environment. Others are maintained as cultures or by keeping back some mixture each time the food is prepared. 'Modernization' will threaten microbial strains introduced in food preparation.

12. Syed Md.Zainul Abedin Abedin, DAE, Bangladesh

I appreciate that indigenous methods of food preparation has been chosen for discussion. This is really a very important area which needs to be investigated in depth to study the impact on food security and nutrition.

I am very confident that this discussion will bring only a fragment of the existing indigenous methods of food preparation in various communities and cultures across the world. I don’t think it can draw any valid conclusion on the aspects of food security and nutrition unless appropriate systematic studies are undertaken.
However, this discussion may be a great starting point for a worldwide study in this regard.

I congratulate all contributors for their valuable contributions.

13. Gill Shepherd, IUCN, United Kingdom [second contribution]

Just a few extra thoughts. Some traditional foods have much symbolical significance, and even though they are time-consuming to prepare, the knowledge of how to cook them remains, because they cooked at special times of year - maybe Christmas among Christians, and certainly throughout the month of Ramadan among Muslims. So it is important to keep those traditions alive.

I think what is really at risk of being lost - knowledge which may become important again if climate change adaptation becomes of especial importance in the future - is knowledge of wild foods and of famine foods, and of food which grows in semi-arid environments. This kind of knowledge probably needs to be recorded in cheap reference guide-books, with drawing or photos of the relevant plants, the kind of habitat where they may be found, and the method of gathering and preparation.

We also need to be aware of the high diversity of land-races (locally bred food varieties) at risk of being lost. I read a PhD some years ago which recorded biodiversity on the farms of wealthier and poorer farmers around Mount Kenya. Poorer farmers kept a much wider range of land-races going than did richer farmers (sub-varieties adapted to particular conditions in particular bits of the farm). Richer farmers tended to buy standard seeds from the market and to grow more commercial crops and fewer subsistence varieties. These land-races are traditional foods very much under threat from Monsanto et al.

14. Peter Andersen, Dept. Geography, Univ. Bergen, Norway

I want to stress the importance of one simple but important "indigenous practice", namely the soaking and/or sprouting of grains, especially pulse grains, before cooking. It used to be common practice in many countries, but with the advent of pressure cookers and commercialisation of split grains, vast numbers of people leave out this step in cooking preparations. It is well documented that soaking and sprouting reduces the content of antinutrients such as phytic acid, and thereby increases the bioavailability of important elements, for instance iron, zinc and calcium. In addition, soaking will reduce the content of oligosaccharides and enzyme inhibitors, reducing the irritation many grains can have on the intestinals. In some cases, it will reduce toxic compounds. And finally, the initial sprouting processes will normally increase the content of important vitamins and reduce the cooking time required. A very win-win situation which only requires a bit of planning ahead.

Although these issues are old established facts, I meet surprisingly many people who find this surprising, and I have very rarely seen any nutrition campaigns that even mention the issue.

15. KV Peter, World Noni Research Foundation, India [second contribution]

There are several well-known Grandmas tips for cooking with zero loss of minerals, vitamins, antioxidants and energy. Always wash well fruits and vegetables before cutting into pieces and leaf vegetables cooked without adding water. Cover the cooking pan to avoid loss of nutrients. Keep always flame low to minimise energy use and slow cooking. Never use heated or used oil for further cooking. Sauces and ketchups mask the original taste and be avoided to the extent possible. Pot herbs like mint, thyme, celery etc can be sprinkled over cooked items to provide natural appeal and flavour. Highly salted pickles are not desirable for people suffering hyper tension. Many such Grandmas tips are in practice which need to be documented.
16. Pitam Chandra, ICAR. India

It is a great idea to bring the traditional food processing knowledge in focus. While some of the traditional practices could be rejected right away on the basis of the current science, there are several others that prove to be beneficial. It must also be appreciated that one practice considered good at location ‘A’ might not prove to be good at location ‘B’ on account of agro-climatic conditions and/or work profile of consumers. For brevity, I am not quoting any examples, but there is a considerable scope to harness the traditional wisdom and practices in food preparation world over for integration with the contemporary knowledge. Today, families are getting smaller and working hours are getting longer with the result that healthy and wholesome food for this class of population is a big concern. Food processing industry today needs to reprioritize their goal from just producing tasty food to tasty and healthy food for targeted groups.

Pitam Chandra

17. Tim Williams, University of Georgia, USA

This topic needs to be clarified.

What defines a traditional food preparation/process? I suggest that we consider processes that modify a major component of the diet, so storage of a grain would not but fermentation would, constitute a traditional food preparation.

Another question to focus the discussion is a definition of at what stage does a process cease to be traditional: since Pasteur canning has been a traditional preservation/preparation process, it is now a traditional practise that is still applied today at the industrial scale. As such it does not need special measures to preserve the knowledge.

Do we expand the topic to include ‘traditional’ methods of preserving foods since food preservation is a critical part of achieving food security?

Do we consider preparations/process that influence the toxicological profile of a food? There are processes that either remove toxins from the ingredient - (rendering them a safe source of nutrition) or increase the contamination (particularly in the case of the mycotoxins).

18. Edward Mutandwa, Mississippi State University (MSU), United States of America [third comment]

Dear Forum members,

I appreciate the dimensions that have been added to this discussion. Perhaps one of the most crucial comment is from Prof Tim Williams from the University of Georgia. I must start by saying that literature does acknowledge the difficulties of showing the difference between "Western" (modern or scientific) and indigenous knowledge (traditional, local, cultural). I had to scramble for a few clarifications. Chambers (1980) attempted to differentiate between the two forms of knowledge by suggesting that Western knowledge is typically centralized and linked with the state machinery (research institutes and universities) while traditional knowledge is dispersed and "associated with low prestige rural life". Traditional food processes include methods like soaking, fermentation, cooking, pounding, and sprouting (Lipski 2010). Another distinguishing feature of
traditional knowledge is the "organic relationship between the knowledge and its community" and subsequent harmony with nature. It will be interesting to see what other forum members have to say on this. **When does a food preparation method cease to be traditional? still lingers on...**

Traditional food preparation may seem inefficient but they are symbols of a culture (Gill). In order to characterize these methods, there is always need for further context specific research due to variations across cultures (Dr Abedin and Pitam from India). Documentation of these practices is important particularly in semi-arid zones (Gill). I am not sure if any of our forum members could give examples of cases and situations where **yeast and bacterial cultures** are treated and maintaned (Heslop-Harrison) but certainly there food safety issues to talk about here. On a related note, soaking is a common practice used in many cultures. There is "science in this practice" because it helps remove antinutrients and enhance bioavailability of nutrients (Andersen). Finally and very interesting, KV Peter observes specific aspects of food preparation that reduce nutrient loss like cutting and cooking without adding water at low heat levels.

Thanks,

Edward

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19. Isabel Maria Madaleno, Portuguese Tropical Research Institute, Portugal

This is a very interesting and important subject. Back in 1998, when researching urban agriculture in Belem, located in the Brazilian Amazon Region, I found that such species as *Eryngium foetidum*, *Talinum triangulare* and *Spilanthes oleracea* were gardened in front and backyards and consumed by local populations (See CITIES, 2000, vol. 17(1): 73-77)

Regarding cassava, which Laura Pereira mentioned in her contribution, the leaf is toxic, (called *maniva* in Brazil) so locals cook it for a long time and eat it in delicious dishes such as *tacaca*, *maníçoba* and *Tucupi* duck. You can read more, only in Portuguese, in my book "A Cidade da Mangueiras: Agricultura Urbana em Belém do Pará", edited by FCT and Gulbenkian Foundation, in Lisbon. For those who do not read Portuguese, please login the EMBRAPA site or the Boletim do Museo Paraense Emílio Goeldi (Belem, Brazil), where you might find translations into English of other papers published on this issues.

As to the Andean region, I found the Carla Mejia links very eluminating. FAO has indeed a remarkable work in this field. As I found in my recent research that focuses mostly medicinal herbs, large number of roots, barks, leafs are still in use. So the idea that indigenous peoples forgot about their indigenous foods is totally misleading. They do continue to prepare them as in the old days, but not so often. Species like quinoa and all sorts of potatoes, yacón (used to control diabetes), as maca roots (tonic and good for the bones, a remarkable antiosteoporosis root) and *Amaranthus* (called Kiwicha in Peru), also *Pasamamisia pauciflora* (Shingi-Panga) are in use and are considered very adequate for children, as they favour their health. Some are simply added to soups as is the case with the last three. I would very much like other input about this region also.

In Costa Rica as in many Central American regions the *Sechium edule* (Chayote), also consumed in Brazil under the name of *xuxu*, is a highly valued Cucurbitaceae that they appreciate enormously. As I found days ago, in my home country, Portugal, people have learned with Brazilian immigrants how to cook it also in soups, we eat *xuxu* more and more, because the current crisis gives families no other choice but to look for nutritious alternatives, meaning dishes that can give more energy to children going daily to school, or to old people that cannot afford to eat meat and fish, as they used to

Isabel Maria Madaleno
PhD in Geography
Value of indigenous foods preparation – nutrition & food security – the next generation is too busy looking to the future

Everyone wants to share in that development dream and, according recent UNDP reporting, the majority of people worldwide are well on their way of achieving it. In the race to develop, however, previous lifestyles and the systems upon which they were once based are being abandoned. Urbanization of human society across the globe is leading change.

Preamble – justifying those changes

The sea-change in eating preferences, foods available and food preparatory techniques and equipment that has taken place during my life-time continues apace; as a reflection of the choices available to my parents when feeding their growing family, and the choices that my wife and I make today. As people gain wealth opportunities change – that’s obvious, but they typically change for the better; better foods, improved nutrition, healthier populations and more interesting lifestyles.

This raises issues for the meaning, and understanding, of ‘indigenous’ methods of food preparation; and, further, of the value – real or supposed – for continuing to promote them into the next period. There is always this inbuilt supposition that ‘mother knew best’ when it came to food preparation and what was practiced before should continue to be promoted. Why?

We no longer live in a 19th century world; and my mother’s culinary knowledge and expertise reflected the energy resources, technologies, access to a garden and basic shops, poverty and lifestyles of her time as a girl growing up in the early 20th century – and learning how to use those 19th century foods and techniques familiar to her mother. You can easily summarize the situation: basic and labour-intensive methods resulted in uninteresting but largely wholesome foods.

Urbanization

So what’s changed during the past 50 years; and more so during the past 20 years? In a couple of words: the ‘Middle classes’ have been discovered everywhere. Once a feature of the industrial countries, this particular group of people can now be found in all kinds of places where they were once least expected; meaning wherever stability has provided people with opportunities for investing their time, intellect and lives. Middle class people invest in their society; and this comes from the opportunities provided by a reasonable government and a buoyant economy.

Check out the report from UNDP[1] of March this year, and their projections of around half the world’s people expected to join in the ‘middle classes’ by 2020, and ponder the ramifications of more than one million households worldwide with an income of >US$20,000 annually (60% of which will be in Asia). The report lists Laos, Mongolia and Bangladesh in addition to India and China. Elsewhere Turkey, Rwanda, Ghana, Mexico and others are shown – in total >30 countries currently considered within that rather out-dated descriptor ‘developing countries’ will have shifted appreciably up the socio-economic scale.

And then project forward a few more years to 2030 when estimated 80% of the world’s population of middle class people will be expected to be living in those same developing countries. And it doesn’t stop there – for the report suggests these same national governments will, collectively, hold more than twice the financial reserves of the industrial countries; in total US$6.8 trillion. Consider the impact that this will have on social development – healthcare, education, empowerment of
women and more; and the juxtaposition that this will bring to global investment, decision-making and more.

**Food and the middle classes**

And, in the context of what those new middle classes may require, issues of indigenous foods preparation may have little relevance. The people will chose - just as my family and I now eat on the basis of a world that is more inter-connected, wealthy and able to take account of value, human health and lifestyles. My parents would have been over-whelmed with the choices available today.

The rise in middle income people can be found everywhere, and these are the people driving change – choice of foods, where they are obtained, the way they are prepared, where they are eaten and, importantly, how much is eaten. The potential impact upon nutrition and security is largely beyond this brief submission but, as with all aspects of human life, there will be winners and losers involved. Obese and overweight people can now be found in most of the low-income countries; people are susceptible to the power of commercial advertising, the lure of those international brand names and the images of those popular public figures from television, films and the Internet – just as they are everywhere.

Watch the kids come out of school in urban Lusaka, for example, and head straight to that kiosk on the street corner and, five minutes later, watch those same kids standing around joking and laughing and, importantly, sharing half-dozen packets of potato chips between them.

The woman on the pavement nearby preparing her (traditional) maize cobs over a small charcoal stove and offering them to the passing trade can still be found, but she’s rapidly losing out to the convenience, image and pleasure of potato chips.

*In fact, this submission was originally intended to promote the humble potato* (*Solanum tuberosum*) *as the most significant choice crop in the fight to boost food security wherever it can be grown, but I got side-tracked at the start. I may still get back with a pro-potato submission if no one else offers one.*

**Innovation and technologies**

People invest in their families and homes and, crucially for well-being, to the motivation and aspiration that result from the example of others. Modern communications technologies have linked communities everywhere – and there is no going back on this one. Similarly food preparation, processing, storage and handling techniques now impact upon people everywhere and, leading change of this kind, is the novel impact of the supermarket; once the domain of the industrial countries, but now found in all communities everywhere. *Supermarkets drive change.*

Fail to adapt, follow change, take advantage of innovation and people will remain captive to the disadvantages of earlier systems. Renewable energy, for example, may resonate as desirable but when this is typified by use of fuelwood, agro-wastes or livestock manure in the home they perpetuate existing environmental and health risks, and the degradation and poverty of countless lives lost by the girls and women responsible for feeding their families. Everyone appreciates power from the flick of an electrical switch. Electricity provides access to modern food preparation equipment in the home, shop or factory; few would voluntarily surrender use of their micro-wave ovens, toasters, grinders, mixers and similar to revert to earlier manual equipment.

**Carrying the insecure forward**

This, however, is not forgetting the estimated 20% of the world's population that continues to remain food insecure and the widening gaps between the rich(er) sectors and the rest in most societies[2]. In many cases, those people are no longer the starving images of food insecurity, emaciated kids and death marches that remain within living memory for many of us, but they
currently represent the better part of half the world's people who have failed to link into the expanding middle classes. Herein is continuing need for social investment in safety nets that will help stimulate the natural drive of people to better themselves, and provide the basis with which they can do so.

**Modern communications**

Vulnerable people of this kind continue to impact given access to modern communications – and particularly television and the use of social networks that link and inform. And, whilst the trend with reducing global poverty is encouraging, natural calamities (and more significantly) those that result from inept socio-political decision-making can impact immediately and quickly destroy previous stable systems. Global reporting kicks in to inform everyone, but this does not always deliver the results required.

**Summary**

*Access to information and to the means of making a difference helps place the original question into perspective - concerning indigenous methods of food preparation and the potential impact on food security and nutrition. On micro-scale there may be value with the resilience of these earlier systems – for those who fail to develop, fail to investment, remain ill-informed and/or fall outside modern trends in national socio-development. The next generation – living in that town or city, providing services or manufacturing, earning a salary and exploring those personal responsibilities with freedom from archaic systems – is far too busy looking forward to be concerned about the past.*

**Peter Steele**

**Rome**

17 May 2013


[2] Gini Index. Check out the Gini Index in your country – the comparison of national income between the rich and poor. Take the Seychelles, for example, with one of the greatest divergences in the world; estimated 60% of the national population living on the handful of inner islands enjoying the highest living standards in Africa, and compare this to the abject poverty of the remaining 40% living on the more isolated outer islands.

**21. Gopi Gosh, FAO, India**

Dear Moderator

The discussions on *Indigenous methods of food preparation: what is their impact on food security and nutrition*, brings to the fore a whole lot of interesting issues. It underscores the need to recognize traditional food products, processes and culinary traditions – unique to several cultures and communities across the world. To do that it has to focus on the need to inventorize, preserve and promote various indigenous and underutilized plant species that are integral to sustain such traditional fares. This diverse agro-biodiversity has great potential for food and nutrition security for many reasons, particularly under the gloomy scenario of climate change.

India is characterised by diverse community groups that represent a multiplicity of cultures, which live in fifteen distinct agro-climatic zones, each with its own types of food and culinary specialities. Many of these indigenous food crops can be effective in countering India’s critical malnutrition problems, as these are locally grown well, with minimal management and external inputs. They also suit better to the culture, ecology as well as the physiology of its inhabitants.
For example, the drumsticks (Moringa oleifera) is one such traditional plants having high nutrition content and almost all parts of the plants (leaves, pods, flowers, bark) have great therapeutic and food values. Particularly, because of its high vitamins, minerals and amino acid contents, it is extremely useful during pregnancy and lactation – thus a boon for anemic Indian mothers and their children (please see for details http://lifestyle.iloveindia.com/lounge/health-benefits-of-drumstick-7477.html). The following links may also give the recipe of various drumsticks preparation (http://www.drumsticksindia.com/recipe/recipe3.htm). Likewise, there are many pulses, oil seeds, grains and fruits and vegetables which sustain and support food and nutrition security for generations of local poor.

Besides, India is home to a large number of traditional plants, herbs, spices and condiments that are traditionally put into culinary and medicinal usage. (see for details of herbs, spices and condiments at http://www.gateway-of-india.co.uk/indian-herbs--spices.html) There has been increased demand from consumers due to their impressive therapeutic values of these ingredients. Not only these are cultivated by small farmers in various pockets of the country, many of these plants are also sourced from the forests by the poor and tribal communities providing alternative livelihood and income generation opportunities. These also offer significant export potential augmenting their income further – again a key issue in food and nutrition security.

The nutritional qualities of these wide varieties of traditional foods alongside its religious and cultural association, demands continued patronage by the people to derive their unique benefits and prevent gradual extinction of these valuable species.

The traditional food segment operates largely in an unorganized set up. This neither provides encouraging remuneration to the small farmers who depend on such activities for their sustenance; nor does it ensure sustained supply of raw materials to the business and the industry. The food security and nutritional status of the poor can be enhanced if the productivity of these crops can be improved with the creation of market demand. Unfortunately these have often been ignored by mainstream R&D and the market. Thus integration of these crops in sustainable food production systems requires active policy support, R&D thrust and market promotion.

Rapidly urbanising middle class and shifting preferences for convenient and 'ready to use' format foods – especially of the young upwardly mobile generation - are creating physical distance between the consumers and the traditional foods that they grew up with. They can patronage traditional food products that they identify with, if such foods are recognised, encouraged and promoted. This necessitates innovative market approaches and interventions for promotion and development of such crops and the valuable traditional foods that prepared out of these indigenous plants species.

With kind regards.
Gopi Ghosh
FAO
New Delhi.

22. Ronald Caltri, Berkeley College, United States of America

Two points: 1. Scopus returns 167 papers on "indigenous food preparation,” many behind paywalls. However, this only includes literature with those key words, there is much more. Check ethnobiology, ethnobotany, ethnozoology, etc., where descriptions are sometimes casual but informative. This is an immense topic, not susceptible to easy summary. For Brazil, close to 1,000 papers would be relevant. More if the non-peer literature were searched.

2. One impression needs reinforcing, one correcting, at least for food consumption in Brazil in the 2002-3 and 2008-9 POFs. Native foods consumption declined overall, in spatial congruence with
well-known land use changes. Rural areas with population spurts showed great declines in own-
consumption. However, declines were quite minimal in the great cities, and somewhat offset by
increasing away from home consumption of recipes including native foods. Native foods are higher
priced than non-native across food groups. So there is hope, if sometimes forlorn due to disparities
and macroeconomic distortions, that well-informed countries will increasingly be keeping current
(with the past).

23. Daniel Adotu, Peoples’ Interventions Worldwide, Uganda

Indigenous way of food preservation is very important in food security because in Teso. People
used to preserve meat in a mound made of soda ash. This had to be smoked meat and the meat is
placed inside the mound made of soda ash and covered. The meat will stay in this mound of soda
ash for as long as six months or beyond without going bad. when a visitor comes and/or when
there is scarcity or need to eat meat that day it will be picked and soaked and then cooked in
groundnuts paste. This will be so tasty meal for that day. In this way, the rural households used to
be food secure.

Also in Buganda, the plantain bananas are prepared in especial way, whereby the bananas are
covered in banana leaves and cooked for hours. The bananas will taste great. They also cooked
meat and/or chicken wrapped in banana leaves. All the ingredients are introduced at the sometime
with the meat and wrapped. This will be steamed for some good time until it cooks well and served
on special occasions like marriages and bid feasts.

24. Salomón Salcedo and Byron Jara, FAO LAC, Chile

Dear FSN Forum members,

Please find below a link to a recipe book on traditional high-Andean products:

mikuy

The book includes recipes from the communities we work with, and some systematization
documents from this experience.

In the following links you will find other useful documents from the systematization of the
experience of the FORSANDINO Project:

- In the protagonists’ own words. The case of Ecuador (systemization of project experiences):
- In the protagonists’ own words. The case of Peru (systemization of project experiences):
- 3 Successful Practices for Successful Policies. The case of Ecuador:
  http://www.rlc.fao.org/en/publications/3-successful-practices-for-successful-policies-
  ecuador/
- 3 Successful Practices for Successful Policies. The case of Peru:
  http://www.rlc.fao.org/en/publications/3-successful-practices-for-successful-policies-
  peru/

Salomón Salcedo and Byron Jara
FAO Regional Office for Latin America and the Caribbean
25. Hiwot Haileslassie, Canada

I find the topic of discussion interesting to participate since it is also in line with my current project. I will contribute the discussion point 1 and 3

1. Are there any lively examples of indigenous methods of food preparation and how do they influence food security and nutrition? Formal published research will be welcome on this point

I want to share about traditional food processing in Ethiopia. Injera is thin fermented bread which is usually made from cereal named tef (Eragrostis tef). It could also be made from other cereals like barley, sorghum and maize. The fermentation process is started by using dough saved from previously fermented dough. One of the side effects of making injera is the shelf life; it can only be stored for three to four days at room temperature. It could stay longer if put in refrigerator but not affordable by the majority. However, recently a study was published that could help to preserve it longer. [Link](http://www.bioline.org.br/request?nd12059) Injera has major contribution to nutrition and food security in Ethiopia, and globally there is interest as gluten free and iron levels compared to other cereals.

Traditional Food-Processing and Preparation Practices to Enhance the Bioavailability of Micronutrients in Plant-Based Diets in Malawi is worth looking at [Link](http://jn.nutrition.org/content/137/4/1097.long)

3. What is the perception of formal public institutes in your country towards integrating IKS in food preparation programs? Are there any opportunities for modifying some methods for example for child nutrition based programs?

Institutes working to improve nutrition have interest in using traditional food processing like fermentation, soaking and germination to improve nutrient deficiency. Alive and thrive [Link](http://www.aliveandthrive.org/where-we-work/country/ethiopia) is working to improve complementary feeding, promoting soaking, germination and preserving meat powered during preparation of complementary foods. However, the challenges were lack of evidence on safety of fermentation to be used for complementary food preparation and nutritional value and impact of the traditionally preserved meat powder. The following link is quick reference book developed to promote traditional complementary food preparation. It is also adopted by the Federal Ministry of Health [Link](http://aliveandthrive.org/sites/default/files/Quick%20ReferenceBook_ENG_rev5.pdf)

Hiwot A Haileslassie
PhD candidate
College of Pharmacy & Nutrition
University of Saskatchewan

26. Edward Mutandwa, Mississippi State University (MSU), United States of America [fourth comment]

Dear Forum members,

I would like to thank you all for the contributions made to this discussion to date.

One striking observation is that people do not share the same opinion when it comes to the value of indigenous knowledge.
Peter Steele’s remarks are quite interesting. He argues that as we move into the future, we may not need to be stuck with archaic food preparation methods. He observes that urbanization, dynamic food preferences coupled with a technologically advanced food processing industry may imply that “old” methods may be abandoned. He however indicates that for food insecure communities, there is need for enhancing communication for better food security approaches. Here is the catch, can we abandon some indigenous food preparation methods, which are integral to social, cultural and traditional setups in the name of development?

A lot can be said on this because there are different views to development (eg Amartya Sen’s model). In my view, there is need to adopt some methods which continue to be beneficial to humanity. Development is context specific and what may fit for developed countries is usually not appropriate for less developed countries due to many factors such as income and geo-physical conditions. Gopi (India), Hiwot (Ethiopia), Manuel from Ecuador and Daniel (Uganda) gave some very lively examples for foods that have medicinal and culinary values such as Molinga Olifera, Injera (which is fermented), smoked meat with soda (which enhances shelf life to as long as 6 months) and plantain bananas.

This does indicate that these methods still have economic, social, cultural, traditional and spiritual value in a wide spectrum of communities and contexts. Isabel also talks about Amaranthus and maca roots which have been integrated into household gardens. More importantly, she highlights that people have not forgotten about indigenous methods ( a point reiterated by Dr Kabiron from Guinea). Institutional support seems to exist for example efforts by FAO to document food recipes for high Andean products (Salcedo and Byron).

However, there are challenges related to documented evidence on the efficacy of these methods (Hiwot, Ethiopia). This discussion is by no means exhaustive because the subject area is vast (Ronald). There are other dimensions such as ethnobotany from which many modern medicines have been created, which have not been discussed here.

27. Salomón Salcedo, FAO, Chile

Dear Mr. Mutandwa,

Thank you for posting the question related to indigenous methods of food preparation and their impact on food security and nutrition. Yesterday we posted links to our FORSANDINO project (2007-2011) on the forum, which took place in the countries of Ecuador and Peru. We would like to provide a specific example from the project, of the project’s work with the Puruway peoples of Ecuador, as a positive example of how to utilize the knowledge of indigenous peoples in the fight against food insecurity, malnutrition, and poverty.

The project sought to revive and disseminate ancestral Andean skills, knowledge and agricultural practices, recognizing their importance for the sustainability of local production systems. The key processes of training and exchange were part of the project’s annual operating plan, but their content was adapted to suit the needs of the beneficiaries, which evolved as the project progressed. The project was limited in duration, so as to facilitate and enhance on-going processes in the community, instead of leading the communities through predefined activities.

The process began by raising awareness in the communities and other indigenous organizations of the province of Chimborazo, Ecuador about the importance of recovering and valuing the Puruway peoples’ traditional crops and farming practices. Workshops were held to have the community members define goals for their communities. The project’s framework called for the selection of community leaders, and these leaders, or chakareros, were selected by the members of the community.

Within the Puruway nation, the chakareros have traditionally served as the wise elders and role models for the community, knowledgeable about the agriculture of the region. They have also organized the distribution of food within the community. While the chakareros had continued to be
present in their communities, their presence had been weakened over time by structural changes that had happened in the communities over many years.

Receiving crucial support from COMICH, the Confederation of the Indigenous Movement of Chimborazo, the FORSANDINO project created opportunities for Puruway community members to gather and preserve the knowledge of the chakareros through the creation of the Council of Chakareros. The exchange of experiences between chakareros and the community was one of the Council’s main tools to improve the community’s agricultural production. The FORSANDINO project supported the chakareros by providing training and connecting them to the community. It also encouraged them to not only maintain their farms, but improve them through the training they had received to be an example to their community.

The impact of the FORSANDINO project can be seen in the improvement in agricultural production, income, and nutrition compared to the project’s control groups. Communities in the project also demonstrated increased community participation, and the Council of Chakareros was also recognized by the government of Ecuador with full legal rights. While it is inevitably the responsibility of the communities involved to continue to exchange the beneficial indigenous knowledge they maintain, as one participate stated, a fire is made with firewood, not kindling alone. The FORSANDINO project helped to reignite the keeping of traditional knowledge and beliefs of the communities involved in the project, one of the project’s overall aims.

This summary of the FORSANDINO project was taken from the following FAO website, titled 3 Successful Practices for Successful Policies:

Salomón Salcedo
Technical Secretary, International Year of Quinoa
Senior Policy Officer

28. Bhubaneswor Dhakal, Nepal

I believe Nepali Gundruk (silage popularly of brassica species e.g. radish and Chinese cabbage) making knowledge and conservation practice are relevant to share in this discussion.

1. Are there any lively examples of indigenous methods of food preparation and how do they influence food security and nutrition?

Formal published research will be welcome on this point. Gundruk making requires practices of fermentation and drying of moderately green leaves of the vegetables. The Nepalese farmers used to preparing and preserving the food item in the vegetable seasons, and eating in vegetable scarcity seasons. It contributes to nutrition not only by preserving nutrients but also by increasing taste by adding aroma. The product is rich in iron and very useful for reproductive women. The vegetable preservation method was popular and important in old days because farmers had limited or no access to green vegetables during off seasons. However, household importance of the food preservation practice has been declining with increasing production of green vegetable all round the year.

2. What informal strategies have been put in place by local communities to ensure that this knowledge is not lost?

Based on my knowledge, communities are not organized to ensure that this knowledge is not lost. However, the knowledge has been conserved in communities. Nowadays people accustomed to the taste of the Gundruk like to eat it even if they have enough access to green vegetable all round the year. People migrated overseas also like to eat the product. Even some children who have grown up
overseas like to have its soup as they took up the taste for the product from their parents. However, some people do not know to produce the product overseas. They ask parents, relatives or friends about the method of producing it. If they cannot produce themselves they ask family to send some as a gift for them. Nowadays the product carries a special Nepali identity. Thus some restaurants have included the soup of the product in their menu. Therefore if senior generation give some experience or taste of the product to new generations the local knowledge of producing or preparing is likely to pass informally to the next generation.

Thank you for reading my opinion.

regards
B. Dhakal

29. Bronwen Gillespie, Action Against Hunger Spain, Perù

Blood Charqui in the Peruvian Andes

Recent surveys show that up to 75% of children under three suffer from anemia in the rural Peruvian Highlands. Because of low uptake of government multi-micronutrients, in part due to cultural factors, ACF Spain in Peru (Action Against Hunger) is working to identify traditional production and consumption practices with implications for the availability of iron in the diet as part of an intervention to reduce childhood anemia developed along with Peru’s Ministry of Health.

Fieldworkers have unearthed the almost-forgotten traditional technique of blood “charqui”, that is, the boiling and drying of animal blood for later consumption. Though blood charqui is no longer practiced, preparing blood-based dishes after slaughtering animals (fried blood with potatoes, blood sausage) is highly culturally acceptable, even if consumption has declined as urban influence grows. In the last generation blood has begun to be treated as waste and fed to dogs. Blood drying is a very simple technique, requiring no special resources or infrastructure, especially as families are accustomed to drying meat. Given that animals are infrequently slaughtered (they represent family savings) and the cost of meat is prohibitive, blood charqui is an iron-rich ingredient that can be stored by mothers and cooked especially for toddlers, without extra cost (while, in contrast, dried meat is quickly consumed as a snack by all family members). Drinking blood is seen by older generations as a cure for “weakness” and the idea that consuming blood helps to strengthen children’s blood makes sense within traditional systems of knowledge.

Working with local mothers, ACF is compiling recipes that make use of cooked blood (for example a very popular dessert – blood mousse) and dried blood (dried blood ground into powder can be added to many recipes to increase iron intake). Mothers who have experience in this blood conservation technique are working to re-value this ancestral practice in other regions of the Highlands, carrying out interactive cooking demonstrations.

30. Klaus Juergen Seeling, private healing consultant, Indonesia

Reading the comments from Uganda & India gives me the opportunity to re-enter in to Discussion of Food Safety for Health.

This is a very interesting aspect of food safety and security, wrapping meat for boiling in Banana/leaves (as I have seen it done in Indonesia, too) and even using various leaves of the forest as supportive vegetables (as I have seen it been practiced in some areas of Germany at the end and after the end of WW2). Even using fleshy Grasses collected from unfertilized meadows & borders of paths, roads & near walls, like parts of plants like of Dandelion (before coming up with flowers, they
tend to turn bitter at that stage), used as vegetables eaten raw with lemon- or orange-juice and beech-corn-oil as products of the forest or stinging nettles (boiled like spinach).

Almost anything grown as fresh leaves will be known to the eldest ladies living around those places to be edible and tasteful, (some, very few may be bitter and even less will be poisonous, so it's worth while to make a list with shapes of leaves recommended for eating, and to watch the animals!).

Basically most buds, leaves and fruits of the forest are in accordance with and can be accepted by the metabolism of vertebrates which all originated from the forest. Most Plants in any Forest (>90% since 400 Mio years) belong to the eldest sort of Photosynthetic plants, the so called C3-type Plant-Species, which form a Glucose able to be transformed into long-term lasting lignin and wood. As the heavier isotopes in the organic chemical compounds disturb the enzyme-reactions, these C3-species contain two beneficial enzymes, Rubisco and Co-Enzyme A which deselect against those heavier isotopes of the organics matter. This means that both the heavier and the super-heavy and partially even radioactive Isotopes (of Hydrogen: 3T* & Carbon:14C*) and the damaging ROS-Sorts, which signalizes "heavier Reactive Oxygen-Species" (17O & 18O) are slightly but for Consumer's Health very significantly reduced in the biomass and their fruits as Products formed by C3-Plants. Formerly Wheat, Rye, Oats, Rice and Barley, Potatoes, Sugarbeet and all Berries, Cherries, Prunus and Plums, Apples and Pears, Dates and Figs and Oranges and Lemons used to belong to that C3-Sort, producing Dextrose or Grape-Sugar as their common basic Product of Photosynthesis.

So C3-Biomass can be built safer and slightly less "contaminated" with the naturally mutagenic radioactive particles [which because of their relatively long (12 yrs as 3T*) and extremely long radioactive half-life-time (5320 yrs. as 14C*) for > 220 Generations].

Such C3-leaves and -fruits (mostly) are of better Health-Promoting Quality as C3-Products for most vertebrates- [except. for Koala-Bears and Pandas who like best and thrive best on their old and only delicatessen as special leaves (Eucalyptus and Bamboo, resp.).

The other big sort of younger food-plants (arising since 4 Million Years) are called C4-Species and are derived from rather fast growing & relatively draught-resistant papyrus-forming Savannah-Plants.

C4-Plants which happen to have lost the Rubisco-Enzyme and take up more of all Carbon-Dioxides in the air and even of the heavy "brackish' water left (after partial evaporation of the lighter parts of the Water after rainfall). And as these savannah-derived plants cannot form lignin and glycogen [which alone is able to be turned into long lasting wood and cellulose and fertilizing Humus] their fruits contain the same heavier particles whether it be derived from Millet, or Corn or Sorghum or Cane Their primary sugar is like the Corn-derived Fructose, which may be processed by yeast into an alcohol, the effect of which however has a different metabolism in Liver, Brain and Pancreas.

In those Countries [of Africa, India and South-America], where these fruits are (and still have to be) used as Staple food for the Population, the greatly balancing benefit for the health of the people used to be that the animals [whose meat was used for sustaining the raw-material of protein for the body's build-up for Enzymes] were not allowed to be fed on Corn or Melasse, or Sorghum or Millet, but they had to run about looking for grass, leaves, buds of bushes and trees (C3-Species !!) thus being able to help the Humans to cope with the food on C4 basis and thus to keep the ROOS-species as low as possible. The Beans and Peas used to fill-up C3-Protein too.

As now off recently most of Human Food-Protein being produced by Animals, raised on feedlots being on natural C4(Corn)-Basis or on transgene/C3-->C4- GMO-Soya Basis the now amply available Animal-Protein is derived from short-lived and force-fed animals, specially bred and fed for the cheap and huge Market. But as Basis for the partially sick and starved Population and their
hoped for and needed safe & healthy Enzymes there is mostly & amply supplied Animal Protein
which strictly speaking ought to be marked as mostly and generally C4-type Food.

31. Julie Cliff, Mozambique

Thanks for the interesting example of the time taken in the preparation of cassava leaves. In the
case of cassava leaves, grinding has a purpose, as it removes cyanogens, which are often present in
high concentrations.

The grinding thus prevents cyanide poisoning.

A recent report of a simpler preparation method also refers to the literature on nutrient content
and preparation of cassava leaves:

Bradbury JH, Denton IC (2011) Mild methods of processing cassava leaves to remove cyanogens

Cassava roots may also contain high concentrations of cyanogens.

For both cassava roots and leaves, removal of cyanogens is an important part of food preparation.

32. Howard Bradbury, Australian National University, Australia.

Dr Edward Mutandwa
Dear Edward

Dr Julie Cliff, who has sent you some material on processing of cassava leaves, has suggested that I
send you results of our experience on processing to remove cyanide compounds from cassava flour
and cassava leaves.

1. Cassava flour.
The wetting method that we developed for removing cyanogens from cassava flour is very simple
as follows:
Cassava flour is placed in a basin and the height of the flour is marked on the inside of the basin.
Water is added with stirring and the volume of the flour decreases and then increases again as
more water is added, until it comes up to the mark on the basin. The wet flour is then spread in a
thin layer not more than 1 cm deep on a mat or basket and left in the shade for 5 hours or the sun
for 2 hours, which allows the enzyme linamarase to break down the linamartin to hydrogen cyanide
gas, which escapes through the thin layer of flour. The damp flour is then used to make the thick
porridge called ugali in East Africa and fufu in DRC. The method has been used for 3 years in DRC
and is being used in DRC to control konzo, see attachment, and is being used in Mozambique in a
collaborative project with Dr Julie Cliff. The fufu is as good as that made from chickwangue. It tastes
much better due to removal of bitter linamarin and stores better than fufu made from untreated
flour, and best of all the women like using the wetting method. Its use is spreading from one village
to another by word of mouth.

2. Cassava leaves.
The current method of grinding the leaves followed by boiling for at least 30 min removes all the
cyanogens from the leaves, but unfortunately the prolonged boiling also removes many of the
vitamins and some amino acids from the protein rich leaves. We are still working on methods for
removing the cyanogens from cassava leaves either at room temperature or at a temperature of 50
degrees C, see attachment. Our best published method is to pound the leaves for 10 min followed
by washing the leaves in water at ambient temperature. The total cyanide content of the pounded,
washed leaves is reduced to 8% after two washes and 3% after a total of 4 washes. This process removes virtually all the cyanogens from pounded cassava leaves without breaking down the vitamins and protein present in the leaves.

Control of konzo in DRC using the wetting method on cassava flour

Mild methods of processing cassava leaves to remove cyanogens and conserve key nutrients

I hope that you may be able to include this submission in your Global Forum, even although it is submitted just before your deadline.

With best wishes.
Dr Howard Bradbury.

33. Harriet Kuhnlein, McGill University, Canada

I have greatly enjoyed reading the submission to the questions introduced by Edward. Globally, we are indeed faced with daily loss of biodiversity in the world of food and by simultaneous loss in knowledge of methods of preservation and preparation of these foods. As a student of many indigenous elders in the techniques of local food harvest, preservation and preparations for family enjoyment and nutrition, I am convinced the only way forward is to do everything possible to document this diversity as best we can. This knowledge is useful for the future generations within a culture, as well as for all of us. With increased documentation and increasing communication technology for sharing this information, we have the potential to take advantage of this vast knowledge known and used by Indigenous Peoples to improve their nutrition and health at the local level and also to provide knowledge to benefit all humanity. With this knowledge we have at least some tools to cope with increasing loss of food species diversity and food shortages in the future.

Please note that the FAO and the Centre for Indigenous Peoples’ Nutrition and Environment (CINE) at McGill University in Montreal has just released the third book in a series resulting from 10 years of research with Indigenous Peoples and their food systems. The first two books define the process to document local food resources (www.mcgill.ca/cine/sites/mcgill.ca.cine/files/manual.pdf and describe the food species and their various methods of preparation and use in 12 diverse rural areas of different parts of the world (www.fao.org/docrep/012/i0370e/i0370e00.htm). Indigenous Peoples’ food systems & well-being: interventions & policies for healthy communities www.fao.org/docrep/018/i3144e/i3144e00.htm ) is the third of the series, released just this past weekend (May 25, 2013) at the United Nations in New York City. Collectively this work presents ways to assist Indigenous Peoples in using their local and traditional food systems in community nutrition and health promotion.

While we support Indigenous Peoples in preserving their culture and resources, we should learn from their knowledge and experience, preserved so far thanks to strong cultural identities. The lessons drawn by this collective work should be taken as an encouragement to pursue the promotion of more sustainable and healthy food systems, adapted to modern life’s necessities and inspired by the sustainable food systems preserved throughout generations by Indigenous and Tribal Peoples.

Finding alternatives to preserve these sustainable food systems and the knowledge, expertise and biodiversity linked to them is of crucial importance to finding solutions to feed a growing humanity today and in the future. I believe that the FAO should take the lead in the huge task of documenting local food knowledge—species identifications, methods of preservation, methods of preparation, food composition, and uses in cuisine-- as it now exists and for our future needs. At the same time,
steps for honoring intellectual property rights and using prior and informed consent for documenting this valuable knowledge should be implemented.

Thank you, Edward, for bringing this discussion forward in the FSN Forum.

34. Vincenzo Lo Scalzo, AgoraAmbrosiana, Italy

In a Proposal of international debate published by AA in September 2011, the report of the CESE input to G20 is cited in ANNEX 1 – In Italian for ease of compilation. This memo is part of a specific reflection based on a large concept of international participation to the plan of forming a mutual global consensus to take care of fundamental need of health, pleasure and cultural content of the human nutrition issue in the development of growth for the third millennium of the global society on Earth.

A humble example of how the debates could be stimulated is given in the draft edited by AA and here cited in Annex 1. Written and mailed to the FAO group of work session on "contribution of indigenous experience on food security and nutrition”, ongoing, May 2013. Signed by founder of AA and my personal name.

Questions of major interest posted by Edward Mutandwa

More broadly: can we consider indigenous methods of food preparation as a viable means for achieving food security and nutrition in rural poor communities?

Answer: indigenous methods of food preparation (raw and cuisine) are the original "viable" method to analyse as reference to progress of food preparation in harmony with the character of each rural community, particularly of food security and nutrition of poor communities.

Interest in hearing from the diverse base of FSN Forum members on the following issues:

1. Are there any lively examples of indigenous methods of food preparation and how do they influence food security and nutrition? Formal published research will be welcome on this point

2. What informal strategies have been put in place by local communities to ensure that this knowledge is not lost?

3. What is the perception of formal public institutes in your country towards integrating IKS in food preparation programs? Are there any opportunities for modifying some methods for example for child nutrition based programs?

4. If indeed indigenous methods are important, what can governments do to create incentives for their continued use?

ANSWERS

Dear moderator: A 1 - In case of difficulty to access or to limited publication of specific methods of food preparation, relevant progress is accessible in relation to helpful information on specific verbal legacy of each community tradition, accessible in each specific site.

A 2 – The task of selecting alternatives in case of negative answer could be assigned to a team on care of organization of focused debates/meetingstreams on each case.
A3 – 4 - Not applicable to European countries? A4 – The proposal looks rational – Our concept to plan a specific scheme of debates for meeting derived by a master or larger global plan of meetings with local and with stakeholders to treat all/many/critical cases is, in our sensibility, applicable.

I enclosed my long reflection on the theme, without condensing direct answers to the suggested hits of the issue. Born in Istria with roots in Sicily and in Croatia I feel as a middle European by DNA and at my age of 81, I feel fine with a large personal frequentation in many of the planet’s regions.

Indigenous tradition is high in my appreciation. How to transfer the good ones? Food is easy and complex at the same time. A close relation is tradition, where territory - man diversity - living models are mixed and makers of the personalization marks of each individuality. Humans are capable to exchange and transfer to each other the pleasure and benefits of food.

My considerations focus a potential scheme to build piers for a synthesis. The similarity focused in the documentation provided and conserved in some less indigenous examples but taken at a time since 5th to the 13th century of most of the European countries, might be spread also to Asian countries of ancient history of civilization and to last centuries in South America, Africa, Australia, etc.

Documents are accessible for a relevant percentage in the web, as well in each country or community libraries and organizations. But also in the legendary myths. The French school has appreciated the value of local legends or myths, that could help to add confirmation of “good” or “bad”, body and soul. It's a large volume of feelings to screen...

I annex the document as is at this stage, ready to develop the examples and concepts in case of intention or agreement. Other contributions arise week by week since the planet has got more than 7 billion 250 million inhabitants, spread around every where, inclusive of frozen areas with the rests of million of mammoths in the Permafrost providing ivory to replace the rare living elephant of our age...

Thanks for your attention

Dr V Lo Scalzo - AgoraAmbrosiana and Lo Scalzo Associates snc

35. Peter Steele, Independent Consultant Agricultural Engineer, Italy

New Crops, novel technologies and new opportunities for boosting food security in traditional societies - potatoes feed the world

Reflections on improved lives

My earlier contribution to the debate focused upon opportunities for food production, handling, processing and storage that arise as the result of technical innovation, which is then quickly taken up by local people as a result of socio-economic progress within local communities. This, I suggested, reflected the increased urbanization of people everywhere; people were (and remain) only too pleased to escape the sometimes archaic traditional practices followed by their parents, and particularly when this releases them from the drudgery imposed. It results in more productive lives.

Edward Mutandwa of MSU summarizes developments of this kind as leading to the abandonment and loss of potentially valuable knowledge, skills, technologies and more. This raises the rhetorical question of 'value to whom'.
Power from steam no longer dominates our society; it's been replaced by more efficient resources and appropriate technologies that better suit our modern-day societies. In our inter-connected and inter-dependent world, why would you want to continue to promote a 19th century technology?

**Interest and enjoyment of new foods**

This second contribution promotes the humble Irish potato representing, as it does, the opportunities that arise from the introduction of new foods into a community; new foods, by definition, do not always have a traditional background in the community.

The name 'potato' can sometimes be confusing. Whereas Irish potatoes and sweet potatoes share similarities in form and appearance when harvested and can be used for much the same culinary purposes, there is no botanical relationship between them. Both crops, however, are important foods. Irish potatoes (*Solanum tuberosum*) and sweet potatoes (*Ipomoea batatas*), respectively, rank #4 and #7 in global food production indices. The descriptor ‘Irish’ once used to differentiate potatoes from the more familiar sweet potatoes available in tropical regions has become less common as production has expanded in recent years.

**Potential of potatoes**

Potatoes represent food (and food security) from the most important of the non-cereal staples that feed the world. High water content, and timeliness and care required with handling and storage largely precludes ware potatoes from large-scale international trading, and thus fluctuations in price are affected more by local and national market impact. This is typical, for example, of East Africa – a region that is doing surprisingly well economically – with encouraging socio-political development.

As rural communities seek higher productivity from their land, potatoes become a logical choice – but optimal climate, soil fertility, water and crop management is required. Fail to make the best choices – varieties, timing, etc. and blight, for example, can decimate the crop. Get the choices correct and earnings, employment and food security out-perform all other basic smallholder food crops. You only have to explore the development of this crop, for example, in Malawi and/or Rwanda to appreciate the value of food crop intensification – the boosted productivity of small blocks of land – and the security of food supplies that follows.

But there is also much to be gained by further investment in production and post-production. Potatoes have the potential to produce ten times more food per unit area than cereals. Potatoes, moreover, have high nutritional value and, importantly, they match those changing demands of urban lifestyles for foods that are novel, quick and easy to prepare - and which project a sense of modern change. The future of urban foods in Africa, I suggest, has a chip-shaped crinkle and great taste (and snaps satisfyingly in the mouth).

**Considering the value chain – not the crop/technology**

But you need to consider the 'value chain' approach to crop development. Value chains provide us with a convenient means of exploring opportunities but, in the low-income countries, they are generally poorly understood and little supported. There is a paucity of services in support of growers, markets and processors in most places. Productivity in East Africa, for example, is half that of the best producers in Africa – in Egypt and South Africa; and 20% that of the best international producers who regularly harvest 40-50 tonnes/hectare.

This represents a considerable loss of potential, but one that is unlikely to change in the short-term given industrial performance that continues to focus upon minimum risk, limited investment and lack of coordination. Governments regular promote the viability of export opportunities – and these
exist – but they fail to provide more than limited resources for R&D, extension and market information support, and none at all for agro-industrial investment.

**Role for the private sector**

National potato industries (NPIs) in the industrial countries are dominated by the private sector – all production, all services, all management and all markets. This contrasts with NPIs in East Africa, for example, where the traditional responsibilities of the public sector continue to prevail. Where Coops/NGOs have been established in support of growers however, and contact made with franchised restaurants in urban centres – to provide one example of potential – productivity has more than doubled. The key issue is one of producing to market demand – choice of variety, production to set quality standards of ware and delivery to set schedules.

**Develop an action plan**

It is not sufficient to monitor status, to determine the constraints to progress and to note opportunities for making a difference. Given the disorganized nature of NPIs in the low-income countries, the lack of investment available and the skewed nature of domestic production – many thousands of growers producing for household consumption and selling small surpluses into markets dominated by traders – planning is required; and the logical starting point is an ‘action plan’. In reality there are two objectives with planning of this kind. The first is focus upon people and their socio-economic welfare, which can be defined as objective #1:

*Objective #1. Socio-economic investment. To improve the productivity of the potato industry and the quality of potatoes grown and sold and, by so-doing, to improve the socio-economic welfare and confidence of the rural potato-growing communities involved.*

And, similarly, a second objective that focuses upon NPIs in the context of national investments, but within regional opportunities; that everyone benefits:

*Objective #2. Regional agro-industrial investment. To integrate NPIs planning into the longer-term requirements of a regional potato industry that will boost efficiency of farm supplies, production, transport and processing, and enable regional industries to compete successfully in home and export markets for ware potatoes and processed products.*

**Summary in one paragraph**

The productivity of the potato crop has demonstrated a capacity to boost food security in areas where it can be grown satisfactorily. Where the crop is new to people in the low-income countries, support is required with which to introduce it. This will require planning and investment. On the one hand – there are the industrial realities, the increasing role of ware potatoes in local diets as populations expand and cultivated land per capita continues to shrink, dramatic trends in urbanization, and growing demand for processed ware potatoes. And, on the other hand – there is the low productivity of NPIs, lack of public and/or private sector support, failure to adopt good agricultural practices and production of low-quality ware potatoes.

**Summary in one sentence**

Full exploitation of the potato crop has yet to be realized; it has the potential to dramatically boost food security in low-income countries where it can be grown.

*This has been a pro-potato contribution in support of food security in low-income communities. I make no apologies to the current debate in further promoting the future of novel food crops, technologies and opportunities. There are few reasons for looking back.*
Tim Cavagnaro, Monash University, Australia

The cassava processing technique discussed by Howard Bradbury is an extremely valuable tool for detoxifying cassava, thereby helping to ensure that cassava is safe to consume.

We recently found that levels of cyanogens in the leaves and tubers of cassava can higher under drought conditions (van der Geer et al, 2012). The increased incidence of konzo (due to excess consumption of cyanogens) during times of drought may be explained by the increased cyanogen concentrations in the plants. It may also be due to increased cassava consumption due to the failure of other less drought tolerant crops and/or decreased availability of water for the detoxification of cassava foodstuffs. Consequently, efforts promoting cassava as a suitable crop in areas likely to become drier with climate change must be accompanied by development activities that help to ensure that growers of cassava are aware of the need for, and appropriate methods to, detoxify cassava.

These issues are discussed further in the following references:


Patricia Tendi, FAO, Italy

As you close your discussion, I highlight a couple of paragraphs from the keynote statement of Ms Mirna Cunningham Kain, UN Permanent Forum Member, delivered at the FAO International Conference on Forests for Food Security and Nutrition, 13 May 2013.

Ms. Cunningham’s full statement is available at this link: http://www.fao.org/forestry/37423-0450cc563e0dccc0086872b80f40682c4f.pdf

... Supplies of wood fuels influence nutrition through their impact on the availability of cooked food. If there is less fuel (or time) for cooking, consumption of uncooked and reheated food may increase. This may cause a serious rise in disease incidence as some uncooked foods may not be properly digested, and cooking is necessary to remove parasites. A decrease in the number of meals provided may have a particularly damaging effect on child nutrition

Since the First World Conference in Rio de Janero in June 2012, Indigenous Peoples have continued to underscore the inextricable link between Sustainable Development, the rights of Indigenous Peoples and the traditional knowledge, cultural understandings and practices that are the basis for the full exercise and enjoyment of our Food Security. All of these elements are included in Indigenous Peoples’ definition of Food Sovereignty developed at the 1st Indigenous Peoples’ Global Consultation on Food Sovereignty and the Right to Food and affirmed in a number of Indigenous Peoples’ International Declarations:

Food Sovereignty is the right of Peoples to define their own policies and strategies for sustainable production, distribution, and consumption of food, with respect for their own cultures and their own
systems of managing natural resources and rural areas, and is considered to be a precondition for Food Security. 2

17. Food Sovereignty, as affirmed in the Declaration of Atitlan, is referenced as a component of the international legal framework used by the United Nations Food and Agriculture Organization (FAO) in its Policy on Indigenous and Tribal Peoples.3 It has been affirmed as a fundamental principle in a number of international Indigenous Peoples’ declarations ...

Thank you and regards,

Patricia Tendi,  
Forestry Department, FAO

38. Lizzy Igbine, Nigerian women agro allied farmers association, Nigeria

Indigenous methods are what we are born with. They are good and we have survived with them over the years. While growing up, I used to visit my grandmother in the village and we plucked mango in the bush and we start eating them.

Today we have discovered better ways of eating and staying healthy. We are now eating better and have less sicknesses, diseases and better living.

This shows development and improvement of life. As life improves, we look forward to use of better and healthier ways to eat our food. We know where we are coming from and we look forward to improved life. Our growth leads us to Science, research and studies. These attempts leads to invention and innovations.

We will not throw away innovation for ignorance and so our growth must be matched with new ideas. This leads us to change though our good old ways before to better ways of doing things. Indigenous methods of food practice should be upgraded to faster, better, and cleaner modern methods without prejudice or regret as Science is to enhance life and better living.

Lizzy Igbine  
Nigerian women agro allied farmers association.

39. Edward Mutandwa, Mississippi State University (MSU), United States of America [fifth comment]

Dear FSN members,

I would to take this opportunity to thank all contributors and the interest generated in this discussion. Many experts believe that indigenous knowledge (IK) is an important tool for achieving food security and nutrition in rural poor communities especially in semi-arid areas and therefore, it should be taken seriously at the policy level. This has been illustrated by the numerous examples from different countries and contexts. A significant number of culturally important methods of food preparation have disappeared mainly because of the forces of urbanization, the emergence of a technologically advanced food processing system which has ushered in fast foods. This reduces the time spent on food preparation and unlocks opportunities in other productive areas for women. Furthermore, constraints like high fuel cost creates a disincentive for people to stick to methods based on IK. Thus is important to ensure that indigenous foods are prepared in a way that meets the needs of a changing environment characterized by dynamic tastes and preferences. This can be achieved through value addition, branding and linkages to local and international markets.

Many interesting, lively and relevant examples of indigenous food preparation were given and more could be provided. For example unique ways of preparing garri, fufu, sweet potato chips, cassava bread, Molinga Olifera, Gundruk, Injera, smoked meat with soda, blood and plantain.
bananas. Food preparation methods are anchored on culture and they have symbolic, economic, social and spiritual values. Nevertheless, some methods result in loss of nutrients for example through overheating which can be avoided for example by shredding leaves. Knowledge on food preparation is usually passed from generation to generation (in rudimentary communities) through informal mechanisms such as the elderly people in the society (grandmother and mama). Such a method of passing information is important but not reliable. Therefore, there is need for formal documentation of these methods. Many organizations have been actively involved in this process but results are scattered.

A lot of research has been and is being conducted to improve food preparation methods based on IK. A good example is that of cassava preparation proposed by Dr Julie Cliff and Howard Bradbury, which reduces cyanogens substantially and ensures that food, is safe to consume. Many public institutions are supportive of efforts to promote indigenous food preparation methods through documentation of food recipes such as FAO recipes for high Andean products. A multi-sectoral strategy involving government and non government institutions will help to integrate IK into food security and nutrition programs. An issue that remains unanswered is related to the nature and structure of incentives necessary for governments to consider IK in food and nutrition policies and strategies.

Thank you,

Edward

40. Gregory Ziegler, Penn State University, United States of America

I want to thank Prof. Harriet Kuhnlein for her introduction to this thread. I only found out about it yesterday, so I have not been able to read it in its entirety. I did want to introduce myself to the group and let you know that I am interested in indigenous methods of food processing and preparation, particularly in Africa. Related to this topic, I have been working mostly in Ethiopia for the last few years. In Edward’s introduction he stated, "Many people rely on methods based on the scientific approach and thus IKS may be at the verge of extinction." I would hope that we didn’t consider science and IKS as mutually exclusive. I believe many of the indigenous ways of food preparation reflect years of womankind’s curiosity creativity focused on the acquisition of a sufficiently healthful diet, not so different from the same curiosity that drives much of science.

41. Violet Kadenyeka Mugalavai, Chepkoilel University College, Kenya

I would like to add my voice to this discussion as it comes to closure.

Indigenous knowledge systems in the aspect of food need to be preserved continuously for future generations to tap into them. We also have migrations or change of context due to employment, or cultural tourists who would be interested in sampling traditional foods of different communities. This may lead to economic gains for the indigenous host and enables social integration and allows learning, fantasy and discovery and eventual acculturation of individuals or groups. This process of cross cultural adoption enables people to perceive, figure out the relative advantage of the food, compare the food they are experiencing with their own existing belief and value systems through various stages such as observations over time in the process of acculturation so as to reduce ethnic discrimination, figure out the complexity involved in the preparation, the symbolic and cultural perspective of the different foods and the enjoyment of the culture together with the other codes and cluster of attributes that go with the context within which indigenous foods are experienced and enjoyed through the subject-object interaction.

Thank you.