

# Policy Brief

## Improving nutrition and health through agricultural biodiversity



October 2015

Agricultural biodiversity - the biological variety that exists among crops, animals and other organisms used for food and agriculture - offers a promising solution to reduce malnutrition, which can slow down national economic development. Research by Biodiversity International and others shows that including agricultural biodiversity in diets can help solve national diet-related nutrition and health issues by providing ready access to the diversity of nutrients needed for healthy growth and living. Major countries like Brazil have recognised that safeguarding and promoting unique biodiversity for food and nutrition are key to achieving economic development as well as improved and sustainable nutrition outcomes. As a result, the country is investing resources to incorporate agricultural biodiversity into important national policies and programmes.

### Key messages

- Agricultural biodiversity can improve economic development, dietary diversity and nutrition
- Personal, community and national food choices that promote agricultural biodiversity help improve nutrition and health
- Greater awareness of nutritious foods can create the demand for nutrition-sensitive agriculture and trigger a virtuous circle supportive of socially and environmentally sustainable food systems

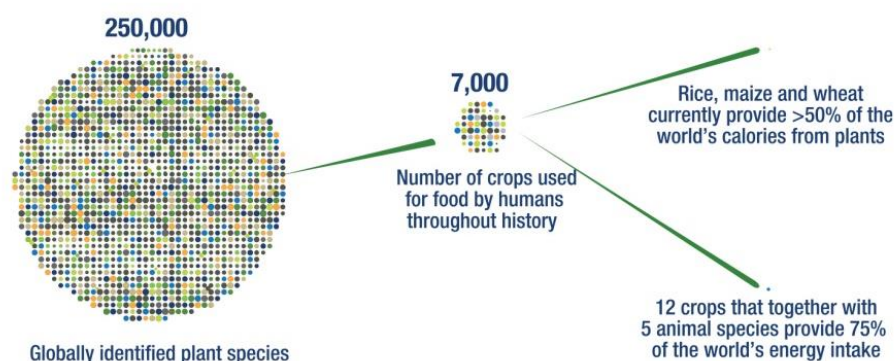
### Actions for policymakers

- Support larger-scale research to provide additional evidence of the nutritional advantage of local agricultural biodiversity and of the impact of agriculture-nutrition pathways
- Develop coordinated, multi-sectoral policies that integrate explicit biodiversity for food and nutrition objectives and indicators into national policy frameworks
- Develop policies that foster nutrition education using culturally and socially appropriate nutrition messaging that can create demand for nutrition-sensitive agriculture and traditional species

## Why agricultural biodiversity matters for nutrition

Encouraging results from Bioversity International and others show that malnutrition can be addressed using agricultural biodiversity<sup>1-3</sup>. As malnutrition numbers remain high, it is evident that global improvements in food production are failing to meet human nutrition needs. Agricultural efforts aimed at producing larger quantities of a few energy-rich staple grains such as maize, wheat and rice have gradually driven many highly nutritious species to disappear from people's diets and to fall into agricultural neglect leading to huge losses in the diversity of foods available. The limited consumption of fruits, vegetables, legumes, livestock, fish, and forestry products and the reduced ability of agricultural systems to produce nutritious foods has been a key driver of malnutrition<sup>1,4,5</sup>. Fostering the conservation and promotion of agricultural biodiversity through national health and food security policies offers a potential solution to reintroduce greater variety into people's diets, achieve improved nutrition-related health outcomes, and reduce national health spending.

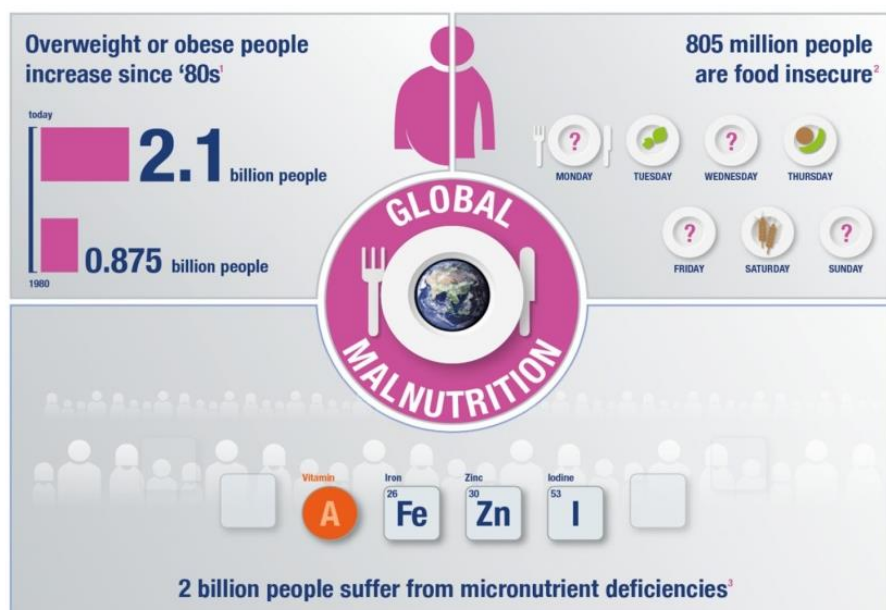
### Shrinking diversity



## The true costs of malnutrition

Malnutrition prevents people and countries from achieving their full potential. One in nine people in the world still lacks enough food to lead a healthy and active life, with poor nutrition accounting for nearly half (45%) of child deaths under the age of five<sup>6,7</sup>. At the same time the excessive consumption of fats, meat, sugars and carbohydrates has driven the population of overweight and obese to 2.1 billion with enormous strain placed

upon national health budgets to meet the costs of diet-related illnesses such as diabetes, cancer and cardiovascular diseases<sup>8</sup>. Another 2 billion people lack one or more essential vitamins and minerals needed in their diets for healthy physical and mental development<sup>9</sup>. These three facets of malnutrition often coexist under one roof and almost all countries in the world (both low- and high-income) are now dealing with the costs associated with the burden of malnutrition in one form or another<sup>6</sup>.



<sup>1</sup> Ng M, Fleming T, Robinson M, et al. 2014 <sup>2</sup> FAO: The State of Food and Agriculture 2014 <sup>3</sup> Global Hunger Index 2014

**Top six global social burdens generated by human beings (GDP, \$ trillion):**



*Remarks:* impact on global GDP 2012. Based on 2010 disability-adjusted life years (DALY) data from the Global Burden of Disease database and 2012 economic indicators from the World Bank; excluding associated revenue or taxes; including lost productivity due to disability and death, direct cost, e.g., for health care, and direct investment to mitigate; GDP data on purchasing power parity basis. \*Impact on global GDP 2013 in US\$ due to global losses in economic productivity through hunger and micronutrient deficiencies.  
*Source:* Dobbs et al. (2014) and \*FAO (2013)

To put malnutrition in economic context, in 2012 obesity was considered the third largest global social burden after smoking and armed conflicts, while in 2013 hunger and micronutrient deficiencies cost US\$1.4 billion or 2% of the global GDP<sup>10,11</sup>. In Guatemala, an undernourished child will earn 20% less in adulthood<sup>12</sup>, and annual productivity losses due to cognitive impairments caused by iron

deficiency in Bangladesh are worth 6.3% of GDP losses<sup>13</sup>. Together, these direct and indirect costs add up to tremendous global economic impacts. Projections by the World Economic Forum and the Harvard School of Public Health further highlight that the costs of diet-related non-communicable diseases (NCDs) under a ‘business as usual’ scenario would reach US\$30.4 trillion globally between 2011 and 2030. This is equivalent to the amount it would take to feed and educate every child on Earth for the next 350 years<sup>14,15</sup>. These staggering numbers show that malnutrition urgently needs to be addressed in order to generate and sustain broad-based wealth and long-term economic growth.

**Food choices matter. How does agricultural biodiversity help nutrition?**

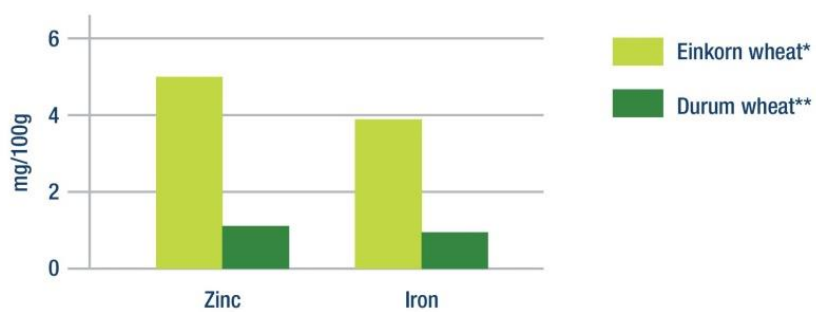
Personal, community-level and national food choices that opt for greater use of agricultural biodiversity can positively affect human nutrition by increasing the variety in people’s diets and the greater intake of essential nutrients needed on a regular basis for good health<sup>3</sup>.

When food shopping, one should be aware that important differences exist in the macro-nutrient (protein, fat and carbohydrates) and micro-nutrient (vitamin and minerals) content of edible species as well as between cultivars and varieties of the same species and between animal breeds and their products. So much so that consuming one species, variety or breed over another can tip the scale between nutrient adequacy and deficiency in human diets<sup>16</sup>.

To prove the point, preliminary results from food composition analysis carried out by Bioversity International’s *Biodiversity for Food and Nutrition Project* (BFN) show that in Turkey einkorn (bulgar) wheat contained five times the amount of zinc and four times the amount of iron than durum wheat<sup>17</sup>. Some small indigenous fish species like mola (*Amblypharyngodon mola*)

**Eating one variety or another of the same species can make a big difference in micronutrient supply**

Mineral element content of the edible parts of wild and cultivated samples of wheat in Turkey



*Remarks:* \*Landrace: *Triticum monococcum*, \*\* cultivated: *Triticum durum*  
*Source:* Ozkan et al. (2014)

consumed in Bangladesh contain 115 times more Vitamin A per gram than silver carp (*Hypophthalmichthys molitrix*)<sup>18</sup>, while studies on the nutrient content of milk have shown that milk from yak and mithun (a large semi-domesticated bovine distributed in South Asia and China) contain more protein (6.5g per 100g of milk) than buffalo (4.0g per 100g) and cow milks (3.2g per 100g)<sup>19</sup>. Despite this evidence, considerable gaps exist in reliable food composition data for many important local nutritious species.

At the landscape level, communities with increased access to wild and cultivated diversity in their immediate surroundings have a greater likelihood of meeting their nutritional requirements. Studies have shown that the higher the species richness the higher the diversity in people's diets, and the lower the frequency of diet-related illnesses. For instance, women living in villages in Sub-Saharan Africa with access to a larger variety of nutritious fruits and vegetables were four times less likely to be affected by iron deficiency (6.7% compared to 23.3% in villages with lower on-farm diversity)<sup>20</sup>.

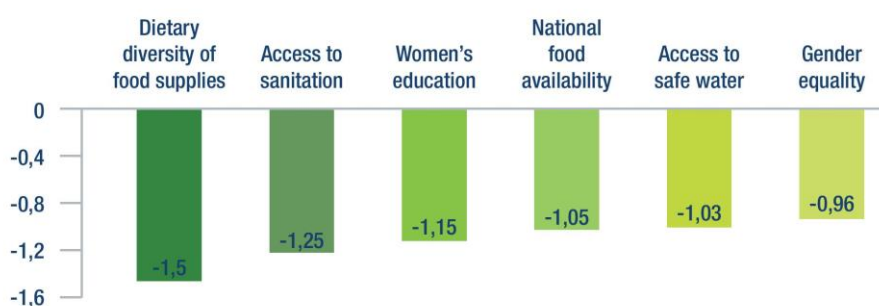
Choices countries make on what food to grow can also affect the diversity of national food supplies and have downstream nutrition-related health impacts. Research conducted by Bioversity International and The Earth Institute, Columbia University<sup>21</sup> demonstrates that countries with diverse food production and less reliance on staple grains exhibit lower prevalence of acute and chronic child undernutrition (stunting, wasting and underweight). Similar results

were observed by Smith and Haddad<sup>22</sup> using data collected from 116 developing countries between 1970-2012, showing that a 10% increase in the diversity of the food supply leads to a 1.5% decrease in the prevalence of child stunting, making dietary diversity the factor with the greatest potential to reduce child stunting, followed by access to sanitation and women's education.

Whether or not individuals, communities and nations chose to make use of this diversity is largely a function of awareness of its importance and knowledge surrounding the use and preparation of available foods<sup>23</sup>.

### Dietary diversity of food supplies is a key driver for reducing child stunting prevalence

Estimated reduction in prevalence of stunting (%) due to a 10 percentage-point increase in determinant



Remarks: Differences of determinants in units of measure with different numerical ranges were statistically accounted for.  
Source: Smith & Haddad (2015)

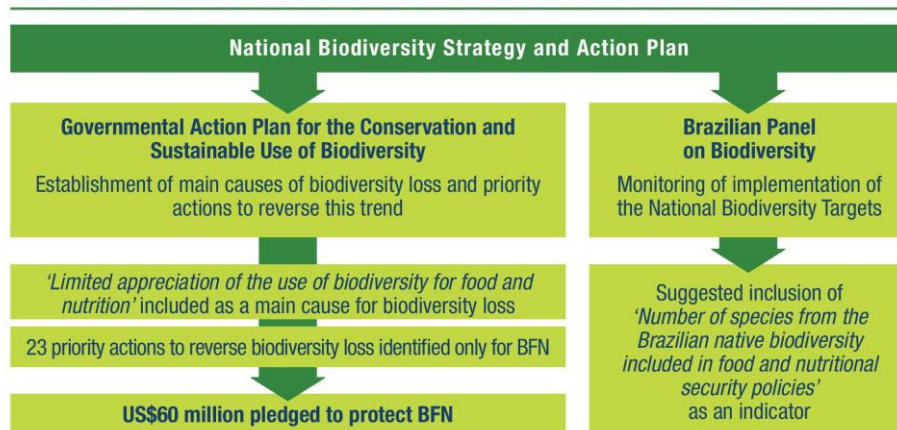
## Raising awareness: What works on the ground

### Formulating policies that mainstream biodiversity for food and nutrition

As part of the GEF-funded BFN Initiative, Brazil - where one in three children aged 5-9 is overweight<sup>24</sup> - is using existing policy programmes as entry points for including agricultural biodiversity. The most successful achievement to date was the revision of the country's National Biodiversity Strategy and Action Plan (NBSAP) drafted to comply with the targets of the Convention on Biological Diversity to halt biodiversity loss. The participatory review, driven by the Ministries of Environment and Planning, brought together 32 institutions from the federal government to identify the main causes of biodiversity loss, among these the '*limited appreciation of the use of biodiversity for food and nutrition*'. Twenty-three priority actions to reverse biodiversity loss and help achieve National Biodiversity Targets were identified and '*number of species from the Brazilian native biodiversity included in food and nutritional security policies*' was successfully included as an

indicator for monitoring target implementation. Brazil also pledged US\$60 million to protect BFN in 2015 and the conservation of agricultural biodiversity with nutrition importance was included as a priority action in the 5<sup>th</sup> National Report to the Convention of Biological Diversity<sup>25,26</sup>. Other approaches include targeting the national school feeding programme to promote healthy eating habits in schools, a scheme which also ensures that 30% of procurement is from local family farmers<sup>27</sup>.

**Existing national policies, strategies and action plans as entry points for mainstreaming biodiversity conservation for improved food and nutrition in Brazil**



Source: Oliveira et al. (2014) and Oliveira (2013)

**Nutrition education plays a role in increasing dietary diversity**

Policies that foster nutrition education have the potential to improve dietary diversity. Work by Bioversity International and partners shows that mothers receiving information on the use of local agricultural biodiversity to improve dietary quality were more likely to feed their children more diverse and nutritious diets by incorporating one or more food groups into their children’s meals<sup>28</sup>. Further Bioversity International research in Kenya has shown that incorporating wild, biodiverse food into diets (green leafy vegetables and wild fruits) also helps reduce the daily cost of obtaining a more nutritious diet by up to 65%, although additional research is needed to understand what the associated opportunity cost may be<sup>29</sup>.

**Food Fairs**

Increasing awareness on how biodiversity can benefit food and nutrition can change eating habits and attitudes to local foods that are often perceived as “food for the poor”. BFN partner countries have all organised traditional food fairs and raised considerable awareness among national policy makers and the general public. A weekly farmers’ market has been launched at the Brasilia Botanical Garden and several cultural gastronomic events organized in different cities, with cooking demonstrations and opportunities to taste native and nutritious biodiverse foods.

**Dietary guidelines**

National dietary guidelines that put greater emphasis on “real food”, as well as guiding nutrition decisions, can help create the demand for nutrition-sensitive agriculture and trigger a virtuous feedback loop and support for food systems that are both socially and environmentally sustainable. Brazil’s recently published dietary guidelines<sup>30</sup> focus on meals rather than single nutrients and encourage citizens to consume local, minimally-processed foods, mainly of plant based origin.

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