Case study on *Improving food and dietary diversity among villagers through home garden diversification by promoting local agro biodiversity*


Biodiversity with high nutritional significance (which will also be referred to as Biodiversity for Food and Nutrition (BFN)) comprises a vast array of cultivated and wild species that, if made available and utilized effectively, can contribute significantly to the dietary diversity, livelihoods and well-being of millions of individuals in communities and countries all over the world, both developed and developing. Many barriers hinder the sustainable utilization of biodiversity with high nutritional potential and have caused it to be relegated to a minor role in agriculture. Yet it could play a strategic role in development, including in food and nutrition strategies. This neglect has travelled at great cost to national healthcare budgets, the global environment and society in general.

Estimated 300,000 plant species worldwide, 10,000 have been used for human food since agriculture started approximately 7,000 years ago (FAO 2010). Only 30 crops provide 90 percent of the world’s food energy intake, and four crops which are rice, wheat, maize and potatoes supply 50 percent of the world’s food energy needs (Prvaiz, 2013).

Even world agriculture achieved caloric sufficiency at a considerable level, millions of people still suffering from deficiencies in essential vitamins and micronutrients in their diet (FAO 2010a). The World Health Organization (WHO 2008) estimates say that over 1.62 billion people including 600 million children are suffering from anemia and deficiencies in essential minerals and micronutrients. Especially in South Asia and Sub-Saharan Africa, suffer from nutrient deficiencies, often termed ‘hidden hunger’ because the affected people receive enough calories but have an insufficient intake of vitamins and minerals (Kahane, 2013). The diversity of indigenous crops and wild plant and animal species available in most tropical countries, in addition to providing essential nutrients, presumably offers broad benefits to health (Timothy and Sthapit, 2014).

Sri Lanka has been identified as one of the countries in Asia with a very high degree of biodiversity. A total of 1414 species of Sri Lankan plants are considered to be of value to the indigenous (ayurvedic) medicine. Among them 50 are heavily used, 208 commonly used and 79 are threatened (Gunathilake et al., 2008). The endemic plant species diversity of Sri Lanka comprises 927 or 28% of flowering plants of which 60% are found in the lowland wet zone and 34% in the mountain zone ecosystems of the island (Gunathilake et al., 2008). A considerable diversity also exists among the major crops cultivated in Sri Lanka, including wild relatives, landraces and traditional varieties.
Udakumbura GN division with two adjacent villages, Udakumbura and Padupola which is one of the pilot sites to carry out Biodiversity for Food and Nutrition (BFN) project activities, is located in the Mid-country, Intermediate Zone of Sri Lanka. Administratively, it belongs to the Udakumbura DS Division of the Kandy district in the Central Province of Sri Lanka. The area is characterized by traditional, tree-based, Kandyan home garden system and is rich in natural agro-biodiversity.

Major occupation of villagers is farming in the area although some households reported adults employed outside the area and earn a regular income. The major agriculture activity is rice cultivation during the rainy season, although some Chena cultivation was also evident. In addition, pepper in home gardens is in every family and used to gain extra income to household. In many households one or more perennial trees such as coconut, jackfruit, kithul, bread fruit and mangoes are found and in some households vegetables and fruits are cultivated.

With the identified agro biodiversity and climatic factors existing within the area, BFN carried out a baseline survey to identify the nutritional status, dietary diversity of the villages with the support of University of Peradeniya. According to the results of the base line survey, pre-school children showed a higher percentage of stunting (24.3%), wasting (27.3%) and underweight (33.3%) than the national average and the average for the Kandy district. In the primary school children (5-10 year-old), a high level of underweight (28.6%) and thinness (23.8%) was observed than stunting (9.5%) and both thinness and underweight were seen mostly in the same child. Among adolescents, ‘thinness’ was the major under nutrition problem (22.6%). Moderate stunting was low and mild stunting was very high (71%) among the children.

![Graph showing undernutrition in pre-school children at Udakumbura in National Level](image)

**Fig: 01: Under Nutrition in Pre-school Children at Udakumbura in National Level**

Dietary intake survey data revealed that cereals, oils/fats, sugar, vegetables and pulses are the most frequently consumed dietary items and the consumption of meat eggs and dairy products
were absent. Consumption of fish, leafy vegetables and fruits was also shown to be very low. Although vegetables were frequently consumed (87% households), the variety of vegetables consumed by the villagers were very low. Comparing the existing statistics to dietary guidelines established, consumption of ‘five fruits and vegetables a day’ was not observed among villagers. Based on USDA food security survey module, only 40% of households in Udukumbura are food secure and 48% and 12% of the households experience food insecurity without hunger and food insecurity with moderate hunger, respectively. The average dietary diversity score of 5.49 for the households indicated a poor quality diet. Energy and nutrient adequacy data suggests that the diet obtained by villagers is adequate in energy content but low in important micro nutrients like iron, vitamin A, vitamin C and Calcium thus highlighting micro nutrient deficient population with low dietary diversity.

![Figure 02: Food Security Status based on Modified USDA Food Security Survey Module](image)

The survey statistics on nutritional indicators highlighted the prevalence of nutritional, food consumption and dietary problems among Udukumbura villagers. Even the biodiversity and resources for the agriculture is very high considerable utilization of agro biodiversity food products have not been occupied adequately. Lack of awareness and knowledge on the tremendous benefits available within the surrounding environment has also affected in poor utilization of the nutrient rich food items.

In order to alleviate malnutrition subsequently increasing the dietary diversity among villages and to promote the agro biodiversity sensitive surrounding and cultivation platform, BFN project initiated a sub project “Home garden diversification in the Udukumbura & Padupola area for 50
households”. Aims were to enhance nutritional status of villages while increasing dietary diversity through establishment and diversification of home gardens and allowing proper utilization of the local food items to withstand the existing health inefficiencies. This sub project was conducted by Provincial Department of Agriculture, Central Province with the close supervision of the BFN project with sub activities including workshops, awareness programs to provide technical support and increased awareness towards the biodiversity for food and nutrition for the health and human wellbeing.

Introduction of local and traditional varieties to home gardens increasing availability of nutritionally rich foods within the living surroundings was promoted through two awareness programs conducted with the support of subject matter officers and agriculture instructors. Awareness programmes were mainly focused on developing sustainable home garden concepts for utilization towards improving human nutrition and food production and trainings on food preservation techniques respectively.

Technical support to the villagers was also extended as trainings. The training on planning and designing the home gardens were conducted to provide a practical knowledge on planning the home gardens accordingly to withstand climatic problems in the area maximizing the land use efficiency by establishing suitable plants. Modernization of home gardens was the next training conducted to increase crop diversity with local and traditional crop varieties with different crop types while managing its micro climate. Training on plant establishment was conducted with the practical sessions of land preparation, digging holes according to the standard measurements, usage of organic matter and pruning and training of plants towards achieving optimum plant architecture. As a final training maintenance of home gardens were focused delivering pest and disease management programs to increase awareness about the introduction of pests and diseases infected crops commonly grown by villagers and integrated pest management with traditional and environmentally friendly methods together with providing trainings on the importance of organic manure application.
Dissemination of planting materials to provide vitamins & micro nutrients rich foods among the population was done during this project. Planting materials of Lime, Pomegranate, Amberella, Rambutan, Passion fruit, papaya, guava, ripen jack fruit (*Waraka*), Kathurumurunga, pommelo, chilli, pumpkin, spinach, radish, capsicum, long been, tomato and okra were disseminated among the selected villagers. To empower villagers towards the cultivation and popularization of newer farming technologies, organic farming, equipments used in agriculture was also disseminated among villagers.

In order to increase the dietary diversity and health status among the villages through sustainable utilization of agro biodiversity home garden establishment was successfully implemented in Udukumbura and Padupola villages. This has laid the villagers to gain knowledge on securing unique agro biodiversity and crop genetics available in their natural ecosystems while utilizing those in a sustainable manner.

At the end of the project, progress monitoring by BFN project management unit along with the Provincial Department of Agriculture, Central Province revealed high crop diversity in home gardens and contribution to daily dietary requirement was also observed to be in higher levels. Self employment opportunities have also initiated among the households where the women started selling the available unique diversified food items as a mean of income generation. Significant improvement in dietary diversity among the villagers was observed while fulfilling essential macro and micro nutrient requirements.

Home garden diversification in the Udukumbura & Padupola villages has a positive impact on increasing food and dietary diversity within a population where evident malnutrition prevailed. The situations have been rectified by effective promotion of sustainable utilization in agro biodiversity rich home gardens in supplementing the daily nutritional and food intake to maintain balanced diet and a healthy life.