

Innovation for Sustainable Agricultural Growth in Togo



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About this study

In 12 African countries and India Green Innovation Centers (GICs) have been established under the “One World, No Hunger” Initiative (SEWOH) of the German government and other investors. The aim of the GICs is to promote agricultural innovation, improve food and nutrition security and build sustainable value chains in the agri-food sector of these countries. The Program of Accompanying Research for Agricultural Innovation (PARI) has been providing independent research to the SEWOH since 2015. PARI is led by the Center for Development Research (ZEF) at the University of Bonn in close collaboration with the Forum for Agricultural Research in Africa (FARA) and its network of national and regional partners in Africa, the African Growth and Development Policy Modeling Consortium (AGRODEP) facilitated by the International Food Policy Research Institute (IFPRI, Africa Office) and other partners in Germany and India. This country dossier offers a situation analysis of the current state of the agri-food sector, related policies and existing agricultural innovations. It thereby provides basic background knowledge necessary to make fruitful investments in line with the country’s policies and its potentials, and to find promising partners for development cooperation.

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Acronyms/Abbreviations

2 SCALE	Toward Sustainable Clusters in Agribusiness through Learning in Entrepreneurship project
CAADP	Comprehensive Africa Agriculture Development Program
CORAF/WECARD	Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles / West and Central African Council for Agricultural Research and Development
CRA	Centre de recherche agronomique / Agricultural research center
DHS	Demographic and Health Surveys
DONATA	Dissemination of New Agricultural Technologies in Africa
ECOWAP	ECOWAS Agricultural Policy
ECOWAS	Economic Community Of West African States
FAO	Food and Agriculture Organization
FARA	Forum for Agricultural Research in Africa
FBS	Farmer Business School
FCFA	Franc des Communautés Francophones d'Afrique
GDP	Gross Domestic Product
GHI	Global Hunger Index
GIC	Green innovation center
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit / German Agency for International Cooperation
GNI	Gross National Income
ICAT	Institut de Conseil et d'Appui Technique / Institute for extension services
IFPRI	International Food Policy Research Institute
IP	Innovation Platform
ITRA	Institut Togolais de Recherche Agronomique / Togolese Agricultural Research Institute
MAEH	Ministère de l'Agriculture, de l'Elevage et de l'Hydraulique / Ministry of Agriculture, Livestock and Water
MAEP	Ministère de l'Agriculture, de l'Élevage et de la Pêche / Ministry of Agriculture, Livestock and Fisheries
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental organization
NSDS	National Sustainable Development Strategy
PARI	Program of Accompanying Research for Agricultural Innovation
PNIASA	Programme national d'investissement agricole et de sécurité alimentaire / National Agricultural Investment and Food Security Program
PPP	Purchasing Power Parity
ProDRA	Programme pour le développement rural et l'agriculture / Rural Development Program
PSTAD	Promotion of Science and Technology for Agricultural Development
R&D	Research and Development
RCA	Revealed Comparative Advantage
SCAPE	Stratégie de Croissance Accélérée et de Promotion de l'Emploi / Strategy for Accelerated Growth and Employment Promotion
SEWOH	"One World, No Hunger" Initiative
SPPO	Service Provider and Producer Organization
SUN	Scaling Up Nutrition
TFP	Total Factor Productivity
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WHO	World Health Organization
ZEF	Zentrum für Entwicklungsforschung / Center for Development Research

1 General background information on the agricultural and food sectors

Togo is located in West Africa, bordering the Bight of Benin, between Benin and Ghana. Its total land area is 56,785 km², the climate is tropical in the southern region and semiarid in the North. Of the total land area, 44% is utilized for cultivated crops, while another 2% supports permanent crops such as fruit- and nut-bearing trees. Agriculture is the most important sector of Togo's economy. The sector employs 75% of the active population, it accounts for 41% of Gross Domestic Product (GDP), and it is the predominant livelihood means for the population. Food crops (mainly cassava, yams, maize, millet and sorghum) account for two-thirds of production and are mostly consumed domestically. The cash crops produced in Togo are cocoa, coffee, cotton and, to a lesser extent, palm oil. These crops provide substantial income for smallholder farmers, and constitute 40% of the country's export commodities. Togo is a net importer of food. The main imported foodstuff is rice, although local rice production has increased significantly in the last two decades.

Togo's agricultural export is dominated by cotton. Cotton production is recovering after a long crisis and reached 82,000 tons for the 2012-2013 agricultural season. Growth in cereal production (including maize) has also increased remarkably, rising from 741,000 tons in 2000 to 1,265,000 tons in 2012; Togo has now become a net exporter of maize in the sub-region.

Environmental issues facing Togo include deforestation due to slash-and-burn agriculture, the use of wood for fuel and water pollution. Soil degradation is an emerging problem that threatens cotton production. Most cotton farmers are under production contract with private companies that possess the sole export and processing rights for cotton. Cocoa and coffee production appears less important than cotton, but informal cross-border trade affects the state records on these commodities. Togo is also known for the export of its rock phosphate, which constitutes a major industry driving the economy; Togo is the world largest exporter of rock phosphate.

Agricultural productivity is low in Togo for several reasons, including lack of access to production assets, minimal training in the use of advanced production techniques, soil fertility maintenance issues, poor access to inputs and output market, among others.

The government of Togo put together the National Agricultural Investment and Food Security Program (PNIASA) that aims to transform the sector and ensure poverty reduction and national development. The program concentrates on the following issues: (i) improving water management, (ii) the sustainability of farms, (iii) improved management of other natural resources, (iv) the development of the agricultural sector and the strengthening of the market, (v) the consolidation of institutions.

The agricultural investment plan will address five sub-programs as follows: (i) promotion of plant sectors, (ii) development of livestock production, (iii) development of fishery products, (iv) agricultural research and consultancy, (v) institutional strengthening and sectorial coordination.

Agricultural research capacity in Togo is sub-optimal and requires consistent upgrading to foster innovation. Togo's Agricultural Science and Technology Indicators evaluation¹ showed that the number of agricultural researchers in Togo increased rapidly in response to a general public-sector recruitment competition in 2009, which prompted the influx of a large number of (mostly Master of Science-qualified) researchers. Togo's agricultural researchers are either in their thirties or fifties. Given that a large number of researchers are set to retire in the coming years, further recruitment efforts are urgently needed. Agricultural research in Togo lies with the Institut Togolais de Recherche Agronomique or Togolese Agricultural Research Institute (ITRA), which was heavily dependent on the support it received from the World Bank through the National Agricultural Services Support Project. A number of other research organization and non-governmental organizations (NGOs) are also carrying out research activities in Togo.

¹ <http://www.asti.cgiar.org/togo>

In twelve African countries, including Togo, Green Innovation Centers (GICs) have been established in selected regions under the “One World, No Hunger” Initiative (SEWOH) of the German government and other investors. The aim of the GICs is to promote agricultural innovation, improve food and nutrition security and build sustainable value chains in the agri-food sector. The selected value chains in Togo are soya, peanut, cashew. Cashew and pulses (soya) are export products with potential importance for the economy and food security. These value chains are also compatible with bilateral programs and the goals of the government.

1.1 Pan-African policies and strategies

Togo signed the Comprehensive Africa Agriculture Development Programme (CAADP) compact in July 2009. As an integral part of the New Partnership for Africa’s Development (NEPAD), the CAADP is Africa’s policy framework for agricultural transformation, wealth creation, food security and nutrition, economic growth and prosperity for all. CAADP represents the commitments of presidents of African countries to commit at least 10% of their budget to agriculture and increase the agricultural sector at an annual growth rate of 6%. Togo has failed to meet CAADP’s 10% budget allocation target and has exceeded the annual 6% growth rate target only four times between 2005 and 2014 (see Table 10). Togo also adopted the Economic Community of West African States (ECOWAS) Agricultural Policy (ECOWAP), which was initiated in 2005 to ensure food security, economic and social development, and poverty reduction in the region. Another objective of ECOWAP is to operationalize the CAADP process in West Africa.

Togo became the 48th country to join the Scaling Up Nutrition (SUN) Movement in March 2014. SUN consists of 55 countries that have committed to scaling up nutrition and working collectively as a movement. The movement unites people—from governments, civil society, the United Nations, donors, businesses and researchers—in a collective effort to improve nutrition. Within the SUN Movement, governments are prioritizing efforts to address malnutrition.

1.2 National (and regional) policies and strategies

The CAADP is the focus of efforts by African governments at the initiative of the African Union and the New Partnership for Africa’s Development (NEPAD) to accelerate growth and reduce poverty and hunger in Africa. The main objective of CAADP is to help African countries to reach a higher level of economic growth through agriculture-led development, to reduce hunger, poverty and food insecurity and enable the development of exports.

In West Africa, the Economic Community of West African States (ECOWAS) is the responsible body for the implementation of CAADP/NEPAD. Based on CAADP policies, ECOWAS developed its regional agricultural policy, ECOWAP, which was adopted in January 2005.

In Togo, the ECOWAP/CAADP implementation process started with the harmonization of its policies, strategies and programs with the principles and objectives of CAADP. Togo is the first West African country to have signed a CAADP compact in 2009. Togo has not met the CAADP 10% expenditure target. The country has, however, surpassed the CAADP 6% growth target in 2005, 2008, and 2011.

1.2.1 Togo’s agricultural development plan

Togo’s main objectives are reflected in the Strategy for Accelerated Growth and Employment Promotion (SCAPE) document, which is based on lessons learned from the implementation of the interim and comprehensive poverty reduction strategy documents. It is a medium-term development framework (2013-2017) to achieve the objectives of the Government Policy Statement, the Millennium Development Goals and the Authorities’ Vision for an emerging Togo by 2030.

A scenario considered for that purpose is a strong and sustainable growth of about 7.1%, supported by ambitious policies such as the modernization of agriculture. Thus, the general objectives of Togo’s

National Policy on Agricultural Development are to promote sustained agricultural growth of at least 6% per year, and to substantially improve the income of producers in order to support an annual rural poverty reduction especially for the most vulnerable (women, youth) by at least 5%, and to achieve sustained improvements in food and nutrition security. The attainment of these objectives depends, among other things, on creating rural wealth through competitive and sustainable agriculture, which is based on the promotion of small and medium-sized agricultural holdings by professionals and organized small producers. These projects are also consistent with (i) the Comprehensive Poverty Reduction Strategic Paper with regard to the strategic objective 1 (increase in agricultural productivity) in area 3 (promoting sources of growth) of Pillar 2 (consolidation of the foundations of strong and sustainable growth) and (ii) the **National Agricultural Investment and Food Security Program (PNIASA)**, that serves as reference for all activities in the agricultural sector which mainly aims at increasing the income of farmers and improve their living conditions on a sustainable basis.

1.2.2 Strategy for Accelerated Growth and Employment Promotion (SCAPE)

In the long term, there is strong political ambition for Togo to be in the group of emerging countries in the next 15-20 years. Comparative tracking of emerging countries indicates that in order to do this, Togo will have to profoundly transform the current structure of its economy; develop the secondary sector, specifically the manufacturing industry; intensify the primary sector and improve the service sector from its informal stage to a more efficient and more professional level. It must reach the stage of middle-income countries in which the employment and income will be better distributed and poverty will be highly reduced.

This industrialization effort must obviously be based on the development of infrastructure, improvement of the business environment, reduction of the costs of factors of production (inputs) and a commitment to be more innovative and open to the world financial system. In its National Sustainable Development Strategy (NSDS), Togo intends to build, by 2030, an environmentally friendly society based on a harmonious social and economic development that safeguard cultural heritage. The priorities identified by the government in the SCAPE to accelerate progress towards sustainable development for the next ten years are reflected in the four strategic areas of the NSDS. These are: (i) the consolidation of economic recovery and the promotion of sustainable production and consumption, (ii) boosting the development of social sectors and promoting principles of social equity, (iii) improving environmental governance and the sustainable management of natural resources, (iv) promoting education and capacity building for sustainable development.

The mid-term (2013-2017) economic policy of the government will mainly seek to lay and strengthen the foundations of the vision for an emerging Togo by 2030. To achieve this, and in response to the challenges mentioned above, there is a need to adopt new priorities relating to: (i) accelerated growth, (ii) employment and inclusion, (iii) strengthening governance, (iv) reduction of regional disparities and the promotion of grassroots development. The first policy direction adopted focuses on strengthening the foundations of the economy and enhancing its potential to achieve an accelerated growth rate to advance the double objective of improving income and creating jobs on the one hand, and to consolidate other export potential on the other. Over the coming years, investment will be the main driver of economic growth in Togo. The ambition is to achieve an overall investment rate that is consistently above 20% with a medium-term goal of 25% of GDP. The public investment effort will be important initially and will be mainly channeled into the construction of basic infrastructure, production of essential public goods, and building up capacity and competitiveness of the domestic private sector, which must imperatively be strengthened in order to play a leading role in growth during the implementation of future economic programs.

A large part of private investment, which is expected to grow gradually to supplement public investment in the mid-term, should indeed come for from foreign direct investors and the diaspora. It could essentially focus on mining, agriculture, infrastructure that has proven economic and financial profitability, the finance sector and construction.

Finally, to make growth inclusive and pro-poor, investment in human capital is also a priority. To ensure the sustainability of economic growth, the government will seek to establish strong foundations of growth on development across the country and to consolidate the sub-regional economic integration of Togo. To achieve this, the government seeks to implement the strategic concept of 'development corridors'.

1.2.3 National Agricultural Investment and Food Security Program (PNIASA)

The first stage in the national implementation of CAADP was the adoption by the different partners of the PNIASA through a signed treaty spelling out the stakeholders' responsibilities in the implementation of this program. The PNIASA is the Priority Action Plan of the Poverty Reduction Strategy Paper for the agricultural sector. It is part of the Pillar II devoted to the consolidation of foundations for strong and sustainable growth. This second strategic pillar reflects the willingness of the government to create, over the next three years, a new foundation for a progressively strong, sustainable and sustained growth. To do this, interventions to promote growth are channeled through nine priority areas. These are: (i) strengthening structural reforms, (ii) improving the business environment, (iii) promoting the sources of growth, (iv) developing growth-supporting infrastructures, (v) strengthening regional integration, (vi) managing effectively of natural resources, the environment and the living environment, (vii) redistributing the fruits of growth, (viii) creating jobs and (ix) promoting research.

For the implementation of the ECOWAS/CAADP/NEPAD project, Togo developed a PNIASA operation plan with a hierarchical framework of actions to be undertaken in the agricultural sector so as to meet the objectives of poverty reduction and food insecurity by 2015. By 2015, the PNIASA aims to reach an agricultural annual growth rate of at least 6%. It is organized into five sub-programs, among which three focus on essential subsectors, namely agriculture, livestock farming, and fishing. Two cross-cutting sub-programs focus on agricultural research and advice and on institution strengthening and sector coordination. The program is based on sustainable investments for achieving an annual growth rate estimated at 6% for plant production, 4.1% for animal production and 4.3% for fish production by 2012.

PNIASA's Sub-programmes

Sub-programme 1: Promoting the plant industry

This sub-programme aims at meeting the country's needs in terms of food products, increasing exports of traditional products and promoting new export crops. This sub-programme involves a farming workforce estimated to 1,500,000 in 2009, divided into farmers' organizations, and farming over 45,000 ha in 2008. The first component of this sub-programme is focusing on the sustainable management of natural resources. It focuses on the fight against the deterioration of natural resources, the restoration of wasted lands and resources due to anthropic activities and the promotion of forestry. The second component, rural infrastructures, is devoted to the full control of the water needed to increase production and for infrastructure projects that can foster the marketing of products. With regards to the third component, food products, PNIASA focuses on intensive production of cereals, particularly maize, rice and sorghum, roots and tubers including cassava and yam. For the fourth component, promoting and diversifying export products, PNIASA's investments will primarily focus on traditional value chains, notably: (a) cotton, whose annual production will reach more than 75,000 tons in 2015, (b) coffee, whose production will reach 26,000 tons, and (c) cocoa, whose production will be about 14,300 tons in 2015. Apart from these products, PNIASA aims at promoting new export products, including pineapple, cashew nut and banana. The objective is to reach 65,000 tons in 2015 with an induced growth rate of 22.5%.

Sub-programme 2: Animal production

It aims to meet the national needs in terms of livestock products through intensive livestock farming and by fostering small and medium enterprises in that sector. According to 2009 estimates, the actions of this sub-programme will benefit 1,225,100 livestock farmers. PNIASA also plans to support the promotion of small and medium enterprises to develop agribusiness value chains such as eggs, meat, and milk.

Sub-programme 3: Fish production

It will help meet national needs in terms of fish products through the development of fish farming on one hand, and the development of continental and maritime fishing on the other hand. The first component, intensification of fish production, will cover the following key activities: construction and pond management, production and distribution of fry, and production and distribution of feedstuffs. It will cover a target population of 8,500 fish farmers, according to 2015 estimates. The second component aims to support continental and maritime fishing. Targeted production and growth objectives in 2015 are 39.59 tons and 6.5% respectively.

Sub-programme 4: Agricultural research and advice

This, sub-programme is essentially dedicated to development research and aims to increase productivity and adapt to climate change through the development of new genetic materials; the development of integrated management technologies for soil fertility, phytosanitary and zoosanitary protection, and processing products; and the funding of research to sustain the intensification of crop systems and increasing production of growth-generating products.

Sub-programme 5: Institution strengthening and sector coordination

It aims to establish a political, legal and institutional environment for the development of agriculture and the achievement of food security. It will contribute to: (i) improving the institutional environment of the sector, (ii) capacity building of public officials and the profession, (iii) improving service delivery by public and private structures, (iv) developing an agricultural development policy, (v) centralizing information on the performance of the sector, (vi) improving planning, implementation, and concerted monitoring and evaluation of investment operations, (vii) improving the absorption capacity of funding and (viii) improving food and nutrition security in Togo and in the sub region.

1.3 Data on food and nutrition security in Togo and GIC region

The following section includes information about important socio-economic and agricultural indicators and data on diet quantity, diet quality and nutrition status.

1.3.1 Socio-economic and agricultural data**Table 1: Selected national economic and health-related data**

Indicator	Value	Year
Population, total	6,993,244	2014
Population growth (annual %)	1.7	2014
Rural population (% of total population)	61	2014
GDP per capita, PPP (constant 2011 international \$)	1,387	2014
GNI per capita, PPP (constant 2011 international \$)	1,228	2014
Poverty headcount ratio at \$2 a day (PPP) (% of population)	73	2011
Poverty headcount ratio at \$1.25 a day (PPP) (% of population)	52	2011
Poverty headcount ratio at national poverty lines (% of population)	59	2011
Rural poverty headcount ratio at national poverty lines (% of rural population)	73	2011
Agricultural land (% of land area)	71	2012
Agricultural irrigated land (% of total agricultural land)	no data	
Agriculture value added per worker (constant 2005 US\$)	681	2014
Agriculture, value added (% of GDP)	42	2014
Access to electricity, rural (% of rural population)	9	2012
Employees, agriculture, female (% of female employment)	48	2006
Employees, agriculture, male (% of male employment)	61	2006
Employment in agriculture (% of total employment)	54	2006
Literacy rate, adult total (% of people ages 15 and above)	60	2011
Ratio of female to male secondary enrollment (%)	53	2007
Mortality rate, under-5 (per 1,000 live births)	85	2013
Maternal mortality ratio (modeled estimate, per 100,000 live births)	450	2013

Source: World Bank, <http://data.worldbank.org/country>

Note: GDP refers to Gross Domestic Product; GNI refers to GNI; PPP refers to Purchasing Power Parity

1.3.2 Consumption and nutrition status

Data on diet quantity, diet quality and nutrition status are relevant for assessing food and nutrition security. Overall, dietary energy supply per capita – a measure of diet quantity – is sufficient in Togo, exceeding the average dietary energy requirement of the population by about 20% (Table 2). Nevertheless, about one tenth of the population is unable to meet minimum dietary energy requirements and suffers from chronic undernourishment. Togo has reduced the prevalence of undernourishment considerably since 1990-92, by more than two thirds overall (Figure 1). Yet, the prevalence of food-overacquisition has risen steeply in recent years: The United Nations Food and Agriculture Organization (FAO) estimates that close to 30% of the Togolese population regularly acquired food in excess of dietary energy needs in 2014-16 (Table 2).

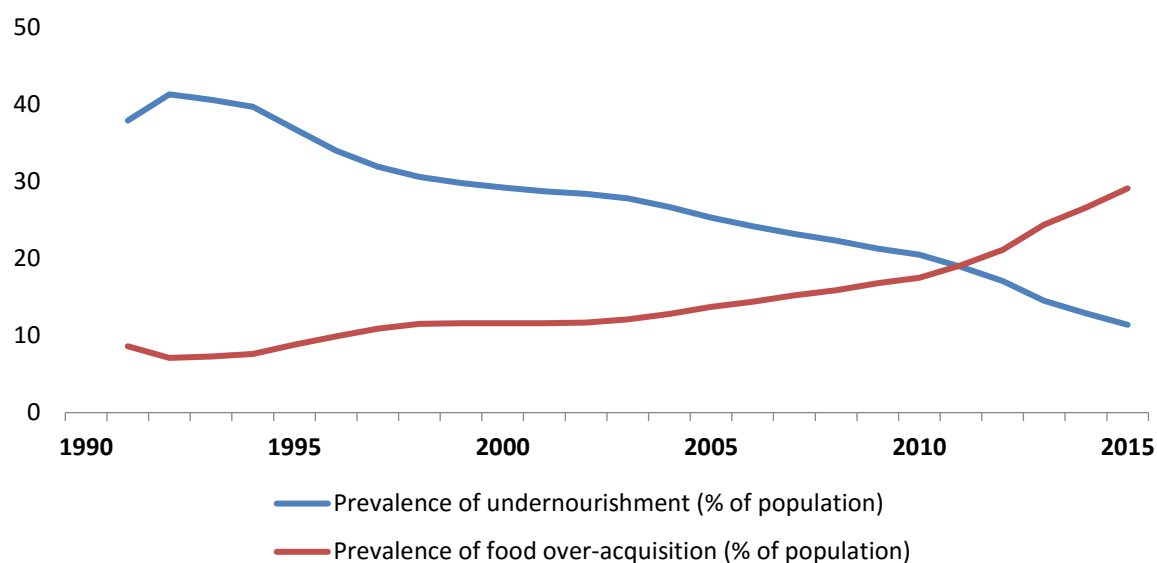
Table 2: Food and nutrition security indicators

Indicator	Value	Year
<i>Diet quantity</i>		
Dietary energy supply (kcal/caput/day)	2659	2014-16
Average dietary energy supply adequacy (% of average requirement)	122	2014-16
Prevalence of undernourishment (% of population)	11	2014-16
Prevalence of food over-acquisition (% of population)	29	2014-16
<i>Diet quality</i>		
Dietary energy supply from cereals, roots and tubers (% of total dietary energy supply)	72	2009-11
Dietary energy supply from carbohydrate (% of total dietary energy supply)	72	2009-11
Dietary energy supply from protein (% of total dietary energy supply)	9	2009-11
Dietary energy supply from fat (% of total dietary energy supply)	19	2009-11
Average protein supply (g/caput/day)	55	2009-11
Average fat supply (g/caput/day)	50	2009-11
<i>Child feeding practices</i>		
Minimum dietary diversity: consumption of 4+ food groups (% of children 6-23 months)	20	2013-14
Consumption of foods rich in vitamin A (% of children 6-23 months)	69	2013-14
Consumption of foods rich in iron (% of children 6-23 months)	57	2013-14
<i>Nutrition status</i>		
Child wasting (% of children under five)	7	2013-14
Child stunting (% of children under five)	28	2013-14
Child overweight (% of children under five)	2	2013-14
Adult overweight and obesity (% of adults 18+ years)	26	2014
Adult obesity (% of adults 18+ years)	8	2014
Vitamin A deficiency (% of children 6-59 months)	53	2013
Anemia in children (% of children 6-59 months)	70	2013-14
Anemia in women (% of women 15-49 years)	48	2013-14

Source: FAO (2016), and authors' calculations based on FAO (2016); Ministère de la Planification, du Développement et de l'Aménagement du Territoire, Ministère de la Santé and ICF International (2015); Stevens et al. (2015), quoted in International Food Policy Research Institute (IFPRI) (2015); World Health Organization (WHO) (2015a)

Note: See Annex A for definitions of the indicators.

Figure 1: Prevalence of undernourishment and food over-acquisition (1990-92 to 2014-16)

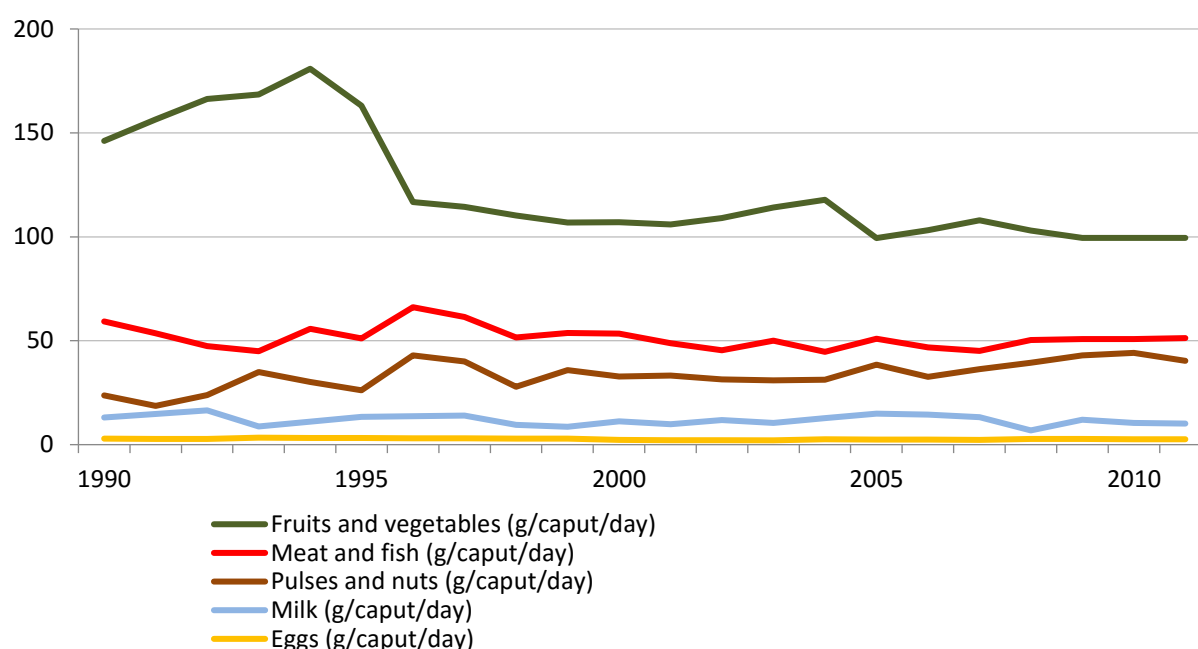


Source: Authors' presentation based on data from FAO (2016)

The diet in Togo is heavily based on starchy staples (mainly maize, cassava, rice, yams and sorghum) that provide more than 70% of dietary energy supply (Table 2). The shares of dietary energy supply from carbohydrates and fat are within the recommended ranges of 55-75% and 15-30%, respectively, but protein supply is slightly below the recommended range of 10-15% (WHO, 2003). This means that the diet is not fully balanced in terms of its macronutrient composition. Judged against protein requirements, average protein supply is borderline, which may put poorer segments of the population with below-average protein supply at risk (Table 2; see Annex A for further explanation).

The consumption of sufficient quantities of non-staple foods such as fruits and vegetables and animal-source foods is essential for a diet that provides adequate micronutrients. Meat and fish supply in Togo has hovered around 50 g/caput/day, and the supply of milk and eggs is at very low levels (Figure 2). The supply of all three groups of animal-source foods has slightly declined since 1990, whereas the supply of pulses and nuts has increased to 40 g/caput/day, providing almost one fifth of the protein in the Togolese diet.² The supply of fruit and vegetables is disturbingly low and has fallen by about one third since 1990, after a transient increase in the early 1990s proved non-sustainable. Amounting to only about 100 g/caput/day in recent years, the supply of fruits and vegetables falls far below the recommended intake of 400 g of fruits and vegetables per day (WHO, 2003).

² Source: Food balance sheet for Togo, 2011, from FAOSTAT, accessed 18 Nov, 2016.

Figure 2: Supply of non-staple foods (1990-2011)

Source: Authors' presentation based on data from FAOSTAT, accessed 07 Oct 2016

Note: Based on their nutrient profiles, pulses and nuts include groundnuts and soybeans, although these foods are classified by FAO as oilcrops. Coconuts are not included among pulses and nuts because they have low protein content.

Infant and young child feeding practices are crucial for children's nutrition and health status and long-term development. Children aged 6-23 months should consume at least 4 out of 7 food groups (minimum dietary diversity) and receive iron-rich foods and foods rich in vitamin A daily. In Togo, infants' and young children's diets fall short of these goals: only one fifth achieved minimum dietary diversity, slightly over two thirds consumed foods rich in Vitamin A, and 57% had foods rich in iron on the previous day (Table 2). Both breastfed and non-breastfed children aged 6-23 months were most frequently fed foods made from grains; other, more micronutrient-rich foods such as meat, fish and eggs, fruits and vegetables rich in vitamin A, and pulses and nuts, were given more rarely (Figure 3). Fortified baby foods, which can compensate for a lack of micronutrients in the diet, were consumed by less than 10% of breastfed and non-breastfed children.

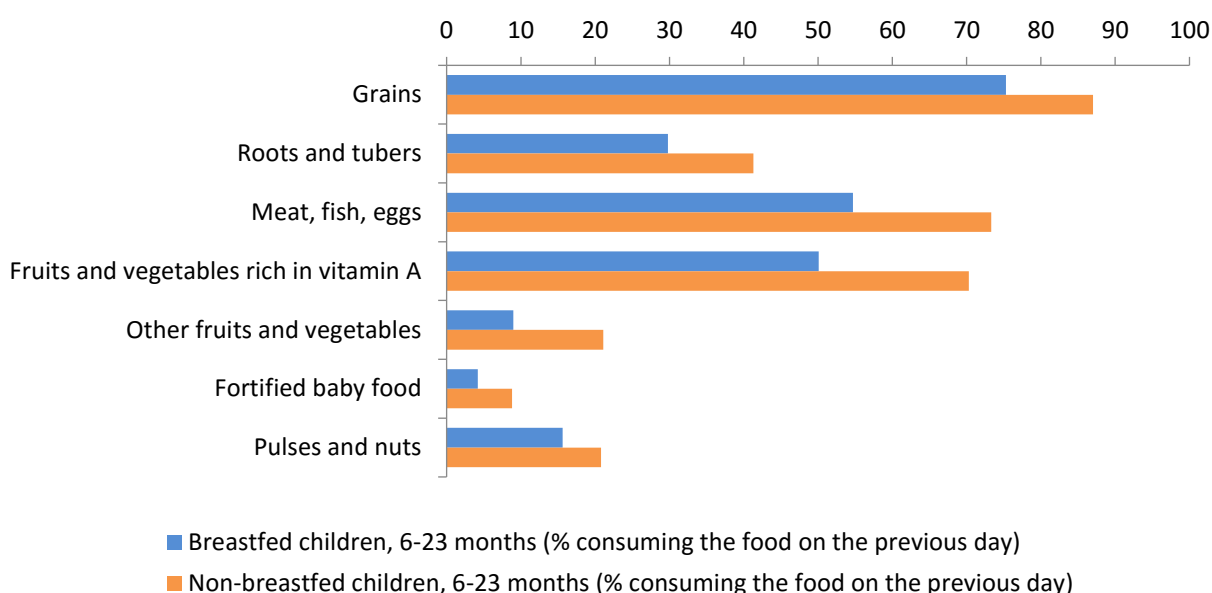
Stunting and wasting are indicators of chronic and acute child undernutrition, respectively. In Togo, 28% of children are stunted and 7% are wasted, which means that the public health significance of both forms of undernutrition is mild (Table 2). The prevalence of stunting was cut back by one third since the late 1980s (UNICEF³/WHO/World Bank, 2016). Wasting has shown large fluctuations during this period – with prevalence rates varying between 5% and 16% – and has hardly improved overall. Overweight among children is low and at present no public health concern (Table 2).

Overweight and obesity are risk factors of chronic diseases such as diabetes (Must and McKeown 2012). About one fourth of adults in Togo are overweight or obese (Table 2). According to data from the Demographic and Health Surveys (DHS), the combined prevalence of overweight and obesity among women of reproductive age has more than doubled since the late 1990s, exceeding 30% by 2013-14, while the prevalence of obesity has more than quadrupled (Figure 4). The prevalence of underweight has fallen to a relatively low national average of 7%.⁴

³ UNICEF = United Nations International Children's Emergency Fund

⁴ See Annex A for definitions of overweight, obesity, and underweight.

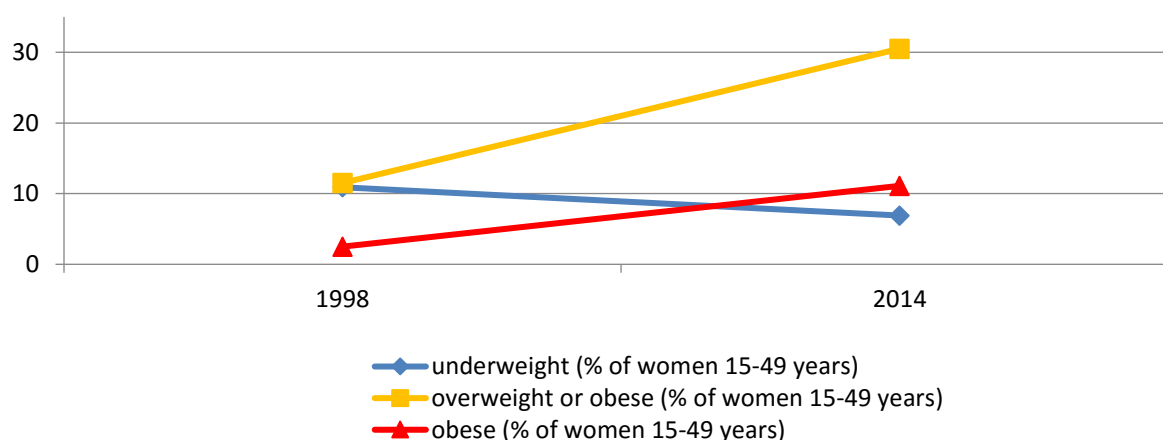
Figure 3: Percentage of infants and young children consuming foods from selected food groups (2013-14)



Source: Authors' presentation based on data from Ministère de la Planification, du Développement et de l'Aménagement du Territoire, Ministère de la Santé and ICF International (2015)

Vitamin A deficiency is a risk factor for blindness and for mortality from measles and diarrhoea in children aged 6–59 months (Imdad et al. 2010; Imdad et al. 2011). In Togo, more than half of all children in this age group are estimated to be vitamin A deficient (Table 2). A high proportion of children aged 6-59 months – namely 70% – and almost half of all women of reproductive age suffer from anemia (Table 2). About half of the global burden of anaemia can be attributed to iron deficiency (WHO, 2015b). Anemia is also caused by malaria, which is widespread in most West African countries, including Togo (University of Oxford, 2015).

Figure 4: Underweight, overweight and obesity among women of reproductive age (1998-2014)



Source: Authors' presentation based on data from ICF International (2015), The DHS Program STATcompiler, funded by the United States Agency for International Development (USAID), accessed 12 Sept 2016

Regionally disaggregated data are available for indicators of nutrition status and child feeding. The diversity of infants' and young children's diets is lowest in the Maritime region and highest in the Lomé region, which includes the capital city and its urban agglomeration (Table 3). The proportion of children consuming foods rich in vitamin A is highest in the Savanes region up north, whereas the proportion of children consuming iron-rich foods does not differ markedly across the regions. In the Kara, Plateaux and Centrale regions in the middle of the country, children have the highest rates of anemia (Table 4). Stunting is particularly low in the Lomé region, with a prevalence rate that amounts to only half (or less than half) the rate in other regions. The Savanes region has the worst performance on both stunting and wasting. Regarding overweight and obesity among women, the Lomé region has by far the highest prevalence, and the Savanes region the lowest, followed by the Kara region (Table 5). At the same time, the Savanes region ranks at the bottom of the list on underweight among women. Anemia prevalence among women is elevated in the Lomé and Maritime regions in the South, and below the national average in the three northernmost regions (Central, Kara, and Savanes).

Table 3: Child feeding practices by region, 2013-14

Share of children 6-23 months consuming:					
4+ food groups		Foods rich in vitamin A		Foods rich in iron	
Region	(%)	Region	(%)	Region	(%)
Lomé	31	Savanes	72	Plateaux	59
Centrale	27	Lomé	70	Kara	58
Savanes	25	Maritime	69	Savanes	58
Kara	14	Kara	69	Lomé	57
Plateaux	14	Plateaux	68	Centrale	56
Maritime	12	Centrale	62	Maritime	53

Source: Ministère de la Planification, du Développement et de l'Aménagement du Territoire, Ministère de la Santé and ICF International (2015)

Notes: GIC regions are highlighted in red. See Annex A for definitions of the indicators.

Table 4: Child nutrition status by region, 2013-14

Prevalence among children under five:						Prevalence among children 6-59 months:	
Stunting		Wasting		Overweight		Anemia	
Region	(%)	Region	(%)	Region	(%)	Region	(%)
Lomé	15	Centrale	5	Plateaux	2	Lomé	64
Centrale	29	Maritime	5	Savanes	2	Savanes	69
Maritime	29	Lomé	6	Kara	2	Maritime	70
Plateaux	31	Plateaux	6	Maritime	2	Centrale	72
Kara	32	Kara	7	Centrale	2	Plateaux	73
Savanes	34	Savanes	11	Lomé	3	Kara	76

Source: Ministère de la Planification, du Développement et de l'Aménagement du Territoire, Ministère de la Santé and ICF International (2015)

Notes: GIC regions are highlighted in red. See Annex A for definitions of the indicators.

Table 5: Women's nutrition status by region, 2013-14

Prevalence among women of reproductive age (15-49 years):							
Underweight		Overweight + obesity		Obesity		Anemia	
Region	(%)	Region	(%)	Region	(%)	Region	(%)
Lomé	4	Savanes	10	Savanes	2	Centrale	38
Plateaux	5	Kara	19	Kara	7	Kara	39
Centrale	5	Plateaux	26	Centrale	8	Savanes	40
Maritime	9	Centrale	28	Plateaux	9	Plateaux	45
Kara	10	Maritime	31	Maritime	10	Lomé	56
Savanes	14	Lomé	46	Lomé	19	Maritime	56

Source: Ministère de la Planification, du Développement et de l'Aménagement du Territoire, Ministère de la Santé and ICF International (2015)

Notes: GIC regions are highlighted in red. See Annex A for definitions of the indicators.

Among indicators of children's nutrition status that are available at the regional level, anemia is the most important in terms of prevalence rates (Table 4). Under the assumption that half of all anemia is due to iron deficiency, iron deficiency anemia among children is of moderate public health significance in all regions.⁵ Stunting has mild public health significance in the Centrale and Maritime regions, and moderate significance in the Plateaux, Kara, and Savanes regions. Wasting is a mild concern in the Lomé, Plateaux, and Kara regions, and moderately high in the Savanes region. Overweight in children is below the threshold for mild public health significance in all regions.

Considering the indicators of women's nutrition status that are available at the regional level, anemia has the highest prevalence in all regions, followed by underweight in the Savanes region, and by overweight and obesity combined in the remaining regions (Table 5). In the Lomé region, 46% of the women are overweight or obese, and about one fifth is obese.

In summary, Togo is affected by both over- and undernutrition, and widespread micronutrient deficiencies pose a challenge. Dietary energy supply needs to be raised in disadvantaged regions and for deprived population groups, while overweight and obesity should be monitored in better-off regions. Dietary diversity can be increased and diet quality improved by developing value chains for vegetables, fruits, animal-source foods, pulses and nuts, and possibly also red palm oil (rich in vitamin A). The decline in the supply of animal-source foods and fruits and vegetables since 1990 is disconcerting and needs to be reversed. Increasing the supply of animal-source foods and pulses and nuts would raise protein and micronutrient supply and help to diminish the heavy reliance of the Togolese diet on starchy staples. The fortification of staple foods and the production of fortified baby foods could be addressed at the processing stage of the value chain. Promoting biofortified staple foods, such as beans rich in iron and vitamin A-rich yellow cassava and orange maize developed by HarvestPlus, also has the potential to improve micronutrient intakes.⁶

Additionally, reducing the aflatoxin contamination of foods is critical in order to improve food safety in Togo. Aflatoxins are highly toxic substances that are produced by certain types of fungi and can cause acute poisoning, liver cancer, and stunted growth in children (Bhat and Vasanthi, 2003; Gong et al.,

⁵ About half of the global burden of anemia is attributable to iron deficiency (WHO 2015b). Since the prevalence of anemia among children in all regions is in the range of 64-76%, the prevalence of iron deficiency anemia can be estimated to be 32-38%, falling within the range of 20-39% that has been defined to classify a moderate public health problem (see Annex A). However, it is possible that less than half of all anemia in Togo is caused by iron deficiency because malaria is widespread in the country.

⁶ See <http://www.harvestplus.org/what-we-do/crops>.

2004). In Togo, aflatoxin contamination of maize and groundnuts is a common problem, and dried vegetables from Togo and other West African countries were also found to be contaminated (Egal et al., 2005; Hell et al., 2009). Children in Togo and Benin experienced a marked increase in aflatoxin exposure when they were weaned onto solid foods, particularly maize. Blood samples from 479 children aged 9-59 months from four agro-ecological zones in the two countries revealed that 99% of the children had been exposed to aflatoxins in the last 2-3 months (Gong et al., 2003). The same cross-sectional study in Togo and Benin found a strong association between aflatoxin exposure and both stunting and underweight in children (Gong et al., 2002). A later, longitudinal study in Benin confirmed that aflatoxin exposure leads to impaired child growth (Gong et al., 2004).

A look at the regions reveals that undernutrition rates among children and women are highest in the Kara and Savanes regions, the two northernmost regions of the country. This suggests prioritizing these two regions, which are at present no GIC regions, for interventions and agricultural innovations. In the Lomé region, which includes the metropolitan area of the capital city, the prevalence of undernutrition is low, but overweight and obesity among women give reason for concern. Togo is a member of the SUN⁷ network, a global movement led by 57 countries that aims to end malnutrition in all its forms.

1.4 Data on most relevant crops and value chains

The most relevant crops in Togo include tubers (cassava and yams), maize, millet and sorghum. Cash crops include cocoa, cotton and palm oil. Production and consumption data are provided below.

1.4.1 Production

Table 6: Top 10 crops produced by area, volume and value

Area harvested (ha)		Production volume (tons)		Production value*	
Top 10	Share of Total (%)	Top 10	Share of Total (%)	Top 10	Share of Total (%)
Maize	32.2	Cassava	25.4	Maize	15.5
Beans, dry	14.7	Maize	19.8	Yams	13.9
Sorghum	13.8	Yams	19.5	Meat, chicken	9.7
Cassava	11.7	Sorghum	7.1	Meat indig., chicken	9.7
Seed cotton	5.5	Rice, paddy	4.8	Cassava	9.0
Yams	4.1	Oil, palm fruit	3.7	Cocoa, beans	7.2
Rice, paddy	4.1	Vegetables, fresh nes	3.6	Sorghum	6.5
Groundnuts	2.9	Beans, dry	3.4	Eggs, hen, in shell	4.5
Millet	2.0	Seed cotton	2.2	Beans, dry	3.8
Coffee, green	1.7	Cottonseed	1.3	Rice, paddy	3.4
Rank 19: Cashew nuts	0.2	Rank 11: Groundnuts	1.0	Rank 16: Groundnuts	1.6
Rank 25: Soybeans	0.1	Rank 26: Cashew nuts	0.2	Cashew nuts	no data
		Rank 33: Soybeans	0.0	Soybeans	no data

Data: average 2012-2014, FAOSTAT, accessed 18 January, 2017

* Gross Production Value (constant 2004-2006 million US\$), data: average 2011-2013, FAOSTAT, accessed 18 January, 2017

Note: GIC value chains marked in red; nes refers to Not elsewhere specified

⁷ See <http://scalingupnutrition.org/> for more information.

Table 7: Overall agricultural growth indicators

Years	Total factor productivity	Agricultural productivity	Budgetary allocation (%)	Contribution of Agricultural to GDP (%)	Agricultural GDP (million US\$)
1995	0.091	-0.004	3.7	37.76	413.1
1996	-0.082	0.131	4.1	40.83	589.6
1997	0.007	0.030	4.2	42.19	666.2

Source: Authors' compilation based on FAO Data, FAOSTAT, accessed 18 January, 2017

1.4.2 Trade

The import of rice accounts for more than 24% of the import volume, but for only 8.7% of the import value. Other important import commodities include wheat, sugar and prepared food. Cocoa and cotton are the most important and most valuable export goods and together account for about 43% of the export volume and for almost 69% of the export value. The GIC value chains, groundnut, cashew and soy, account for only small shares of import and export trade in Togo.

Table 8: Togo's imports

Import volume (tons)		Import value (US\$)	
Top 10	Share of Total (%)	Top 10	Share of Total (%)
Rice – total (Rice milled equivalent)	24.7	Wheat	15.0
Wheat	16.2	Food prep nes	10.2
Sugar refined	9.9	Rice – total (Rice milled equivalent)	8.7
Oil, palm	5.8	Oil, palm	7.1
Sugar Raw Centrifugal	5.6	Cigarettes	6.8
Food prep nes	5.3	Sugar refined	4.3
Oil, linseed	3.0	Milk, skimmed dried	4.2
Tomatoes, paste	2.8	Meat, chicken	4.1
Meat, chicken	2.3	Malt	3.8
Oil, vegetable origin nes	2.1	Tomatoes, paste	3.1
Rank 65: Oil, soybean	0.0	Rank 36: Oil, groundnut	0.3
Rank 83: Cake, soybeans	0.0	Rank 66: Oil, soybean	0.0
Rank 84: Cashew nuts, with shell	0.0	Rank 116: Cashew nuts, with shell	0.0

Data: average 2011-2013, FAOSTAT, accessed 18 January, 2017

Note: GIC value chains marked in red; nes refers to Not elsewhere specified

Table 9: Togo's exports

Export volume (tons)		Export value (US\$)	
Top 10	Share of Total (%)	Top 10	Share of Total (%)
Cotton lint	23.2	Cotton lint	35.7
Cocoa, beans	20.1	Cocoa, beans	32.9
Oil, palm	8.4	Beverages, non alcoholic	5.7
Beverages, non alcoholic	8.0	Oil, palm	5.7
Cottonseed	3.3	Sugar confectionery	2.0
Sesame seed	2.8	Coffee, green	2.0
Bran, wheat	2.6	Milk, whole condensed	1.4
Maize	2.5	Milk, skimmed dried	1.4
Cake, cottonseed	2.4	Milk, whole dried	1.3
Coffee, green	2.3	Ice cream and edible ice	1.2
Rank 15: Cashew nuts, with shell	1.7	Rank 19: Soybeans	0.4
Rank 21: Soybeans	1.0	Rank 20: Cashew nuts, with shell	0.4
Rank 26: Cake, groundnuts	0.5	Rank 23: Cashew nuts, shelled	0.3
Rank 39: Cake, soybeans	0.1	Rank 33: Cake, groundnuts	0.1
Rank 46: Cashew nuts, shelled	0.1		

Data: average 2011-2013, FAOSTAT, accessed 18 January, 2017

Note: GIC value chains marked in red; nes refers to Not elsewhere specified

1.5 National (and regional) innovation system

1.5.1 Research system and organizations

1.5.1.1 International

Some of the international organizations active in Togo's agricultural research are listed below:

- Africa Rice Center: focus on rice;
- International Institute of Tropical Agriculture: focus on crops;
- International Center for Tropical Agriculture: focus on crops and soils;
- Centre de Coopération Internationale en Recherche Agronomique pour le Développement: focus on crops, livestock, food and energy security, public policy.

1.5.1.2 National

The Togolese Agricultural Research Institute (ITRA) was established by Decree No. 97-105 / PR on 23rd July 1997 and its main mission is to coordinate the national agricultural research system and conduct research to promote agricultural development across the country. ITRA's institutional vision is to be a research institute that meets the needs of Togolese farmers and addresses international issues of agriculture and sustainable development. It has a scientific strategy based on the division of the country into four agro-ecological zones for research, each zone hosting an agricultural research center (CRA). CRAs are centers of excellence for research on specific products:

- CRA - Coast based in Davie;
- CRA - Forest area based in Kpalime;
- CRA - Wet Savannah based in Kolokopé;
- CRA - Dry Savannah based in Kara.

Program of Accompanying Research for Agricultural Innovation (PARI)

ITRA has five priority research areas:

- Natural resources management;
- Food and industrial crops;
- Animal and fish production;
- Food technology, nutrition and quality;
- Socio-economic studies, technology transfer and training of partners.

Activities are organized in research programs and hosted in the CRAs, based on their agricultural vocations. A concerted schedule of research activities is developed in partnership with producers through a participative mechanism and is used to diagnose the challenges and to approve the research budget of the year. A transfer mechanism of technologies, in conjunction with the Support Mechanism for research system, contributes to assessing transferred technologies, as well as their adoption and impact. There is also a supervisory board (at the ministerial level), a board of directors and science board to endorse program budgets for research and monitoring and the evaluation of activities.

The list below presents some of the national research organizations that carry out research activities in the agricultural and food sectors of Togo:

- Government:
 - Direction de la Protection des Végétaux, Ministère de l'Agriculture, de l'Élevage et de la Pêche (MAEP): focus on crops;
 - Direction des Statistiques Agricoles de l'Information et de la Documentation, MAEP: focus on socio-economics;
 - ITRA, MAEP: focus on crops, livestock, natural resources, off-farm post-harvest, river and lake, socio-economics.
- Higher Education:
 - École Supérieure d'Agronomie, Université de Lomé: focus on crops, livestock, pastures & forages, off-farm post-harvest, forestry, agricultural engineering, socioeconomics;
 - Faculté des Sciences, Université de Lomé: focus on crops
 - École Supérieure des Technologies et Biologies Alimentaires, Université de Lomé: focus on off-farm post-harvest.

1.5.2 Innovation platforms

1.5.2.1 FARA Platforms

The Promotion of Science and Technology for Agricultural Development (PSTAD) project led by the Forum for Agricultural Research in Africa (FARA) used multi-stakeholder innovation platforms (IPs) in its the Dissemination of New Agricultural Technologies in Africa (DONATA) initiative. The IPs were used to facilitate the rapid dissemination and adoption of innovations along the value chains of cassava and maize in Togo, Benin, Burkina Faso and Sierra Leone. The DONATA constituent of the PSTAD was implemented in Togo from 2011 to 2014. Activities were implemented in the northern region of Togo, notably in the Kara and Savannah regions. Promoted technologies included quality protein maize and notably, *Obatanpa*.

In the implementation of the project, six IPs were developed including four in the Kara region and two in the Savannah region. All platforms were developed around the production of maize grains and seeds, marketing of the product, and its usage in cooking local dishes and baby cereals. Today, six IPs are operational at different levels, based on actors' motivation. They are run by management committees and some of them have signed a Memorandum of Understanding among actors.

The platforms have helped in addressing the constraints of poor access to product markets and low prices following good harvests. The platforms have also created a strong collaborative environment that has increased trust among stakeholders along the value chain. Some constraints that affected the

success of the initiative include the inadequate understanding and application of the concept of an IP, and the lack of effective technical backstopping support to facilitate the IPs (Arinloye *et al.*, 2013).

1.5.2.2 West and Central African Council for Agricultural Research and Development (CORAF/WECARD) Platforms

The West and Central African Council for Agricultural Research and Development (CORAF/WECARD) established six IPs in Togo, Niger and Mali to test improved white pepper varieties. The women platform actors, who organized themselves in a cooperative, earned US\$ 9,000 in 2012, which increased to US\$ 16,000 in 2013 (Njoya *et al.*, 2015).

Platforms within the framework of the Programme de Productivité Agricole en Afrique de L'Ouest

Today, five IPs are in the process of development led by actors in the five economic region of Togo. These include:

- Savannah Region: guinea fowl
- Kara Region: rice
- Central Region: soya
- Plateau Region: small ruminants
- Coastal Region: tomato

IP for the livestock-market gardening project:

A platform for Wangash cheese was developed within the context of the Milk and Market Gardening Project in 2011 in the eastern zone of the Coastal Region. It is still operational and needs to be evaluated and supported.

GIFS CORAF Platforms

To manage soil fertility in the west of the Savannah Region and in the east of Kara and Coastal Regions, IPs were developed as part of the implementation of CORAF's competitive project 'Development and Promotion of Integrated Management of soil fertility through a production improved system conducive to increase the productivity of key food products in Benin, Togo and Burkina Faso'

Promoting crop integrated management technologies to increase plantain productivity among small producers in Western and Central Africa

The CORAF/WECARD competitive funds project "Promoting crop integrated management technologies to increase plantain productivity among small producers in Western and Central Africa" was implemented in Togo from 2011 to 2013, based on a Memorandum of Understanding for a sub-grant signed between the African Centre for Research on Banana and Plantain and the ITRA. The project was also implemented in Benin, Cameroon, Congo, Ghana, and the Democratic Republic of Congo. The following activities were undertaken to achieve the targeted objectives: (i) conduct a survey to define the baseline situation for the plantain baseline, (ii) creation of a pilot center to host the infrastructure needed to implement the activities, (iii) creation of IPs, (iv) capacity building for actors, (v) development and monitoring of experimentation plots and a seed manufacturer, (vi) support to regional and national monitoring and evaluation missions, (vii) coordination of activities.

There are achievements, but there were also challenges in the implementation of these activities, including: erratic weather, notably scarce rainfalls, which disturb the development of experimentation plots and plants, and other challenges related to platform operations.

1.5.3 Extension system and organizations

The public institutions providing extension services in Togo include the Ministry of Agriculture, Livestock and Fisheries, ITRA and Ecole Supérieure d'Agronomie, Université de Lomé. ITRA is Togo's main agricultural research and development (R&D) agency, and hosting more than 70% of the agricultural researchers in the country in 2011. A farmer-based organization, Federation des Unions de

groupements des Producteurs de Café et de Cacao du Togo, also provides extension services. The Farmer Field School extension model has been used in a few agricultural projects. Extension services in Togo are presently limited by a decline in the number of extension officers, weak organization of producers, particularly of small-holder farmers, lack of harmonization of agricultural extension strategies, and lack of an extension policy.

1.5.4 Private Research and Development activities

Agricultural research in Togo is largely financed and undertaken by the national government through ITRA. Some private organizations such as the Groupe d'Actions et de Recherche pour un Développement Humain Durable, Union Chrétienne de Jeunes Gens, and Association pour la Promotion de l'AgroForesterie have financed some projects in the past with funds from German and Belgian organizations as well as with internally generated resources (Stads and Adomefa, 2004). There is no known NGO or private-sector company conducting in-house R&D activities in Togo. Some NGO's or private companies, however, outsource their research to ITRA or the University de Lomé (Stads et al., 2014).

1.6 Key challenges, emerging needs and potentials in the agricultural sector

Challenges of Togo's agricultural sector include:

- Climate change: For instance, the floods of 2010 caused 21 deaths, inundated 3,947 houses and destroyed 7744.24 ha of farms and several bridges. There is also erratic rainfall;
- High rate of deforestation;
- Limited access to improved seeds and fertilizers;
- Limited access to credit and agricultural financing;
- Very low agricultural productivity;
- Land insecurity;
- Weak extension and advisory services;
- High rate of post-harvest losses (between 25% and 60% of production).
- Additional issues that affect the agricultural sector directly or indirectly include human health and nutrition. Malnutrition rates in Togo are alarming: infant mortality rate is 78/1000, prevalence of weight insufficiency is 16.6%, growth delay is 29.7%, and 11.1% of babies are underweight. Excessive malnutrition and lack of micro-nutriments coexist. According to the 2010 STEPwise approach to Surveillance Survey report, 22% of Togolese people suffer from excessive malnutrition. In light of this problem and based on the recommendations and multiple significant commitments made by the state authorities, many strategies are envisioned and set as government priorities in the fight against malnutrition in all its forms.

1.7 Potential areas for investment in Togo

Based on the general approach presented in chapter 4 of Husmann et al (2015) and in pursuit of efficiency and effectiveness, investment by Germany into the agricultural and food sector are suggested in African countries that:

- Show actual progress in sustainable agricultural productivity driven by related innovations, as indicated by comprehensive productivity measurement and innovation actions on the ground;
- Have a track record of political commitment to foster sustainable agricultural growth, as indicated by performance under CAADP; and

- Prioritize actions for hunger and malnutrition reduction and show progress where agricultural and rural development and nutrition interventions are likely to make a significant difference, as indicated by public policy and civil society actions.

Results of the assessment for Togo⁸:

Expected agricultural growth performance:

- Togo has increased its agricultural growth by more than the annual 6% agricultural growth target defined by CAADP for four years only, between 2005 and 2014 (www.resakss.org).
- In addition, total factor productivity in Togo has declined by 6% between 2001 and 2008 (Fuglie and Rada, 2011). This indicates that Togo's innovation performance over this period was poor.

Government commitment:

- Togo has a track record of political commitment to foster sustainable agricultural growth by being active in the CAADP process and having completed six of the eight steps in the CAADP process (www.resakss.org).
- However, the Togolese government has not shown willingness to invest in agricultural sector. In no single year has the government invested more than 10% of total government expenditures (CAADP target) into agriculture between 2005 and 2014 (www.resakss.org).
- In addition, Togo spends only 0.4 % of its agricultural GDP on agricultural R&D, which is much lower than the Sub-Saharan Africa average (www.asti.cgiar.org) and the African Union target value of 1% spent on R&D. This suggests that the country's commitment to R&D into the agricultural and food sector is not yet sufficient.

Food and nutrition security progress and need:

- Togo is prioritizing actions for hunger and malnutrition reduction and shows a slightly lower than 10% improvement in undernourishment between the years of 2001 and 2011 (FAO 2014).
- In addition, Togo has a Global Hunger Index (GHI) score value of 13.9, reflecting a serious level of hunger (von Grebmer *et al.*, 2014)⁹. This makes investment into the agricultural and food sector in Togo very urgent in order to fight the high rate of food insecurity.

Table 10: Togo performance indicators

Indicators	Indicator score	Overall score
1. Number of years with more than 6% agricultural growth (2005 to 2014)	4	40
2. Percentage point change in TFP index between 2001 and 2008	-6	0
3. Number of years with more than 10% government expenditure (2005 to 2014)	0	0
4. Average share of agricultural GDP spent on R&D (2005 to 2011) in %	0.4	43
5. Steps in CAADP completed	6	75
6. Percentage point improvement in undernourishment between 2001 and 2011	9.8	60
7. Global hunger index (2014)	13.9	30
Total score (weighted)		35

Data source: Husmann *et al.* (2015)

Note: TFP refers to Total Factor Productivity

⁸ Details on the data sources and methodology used in the assessment can be found in Husmann *et al.* (2015)

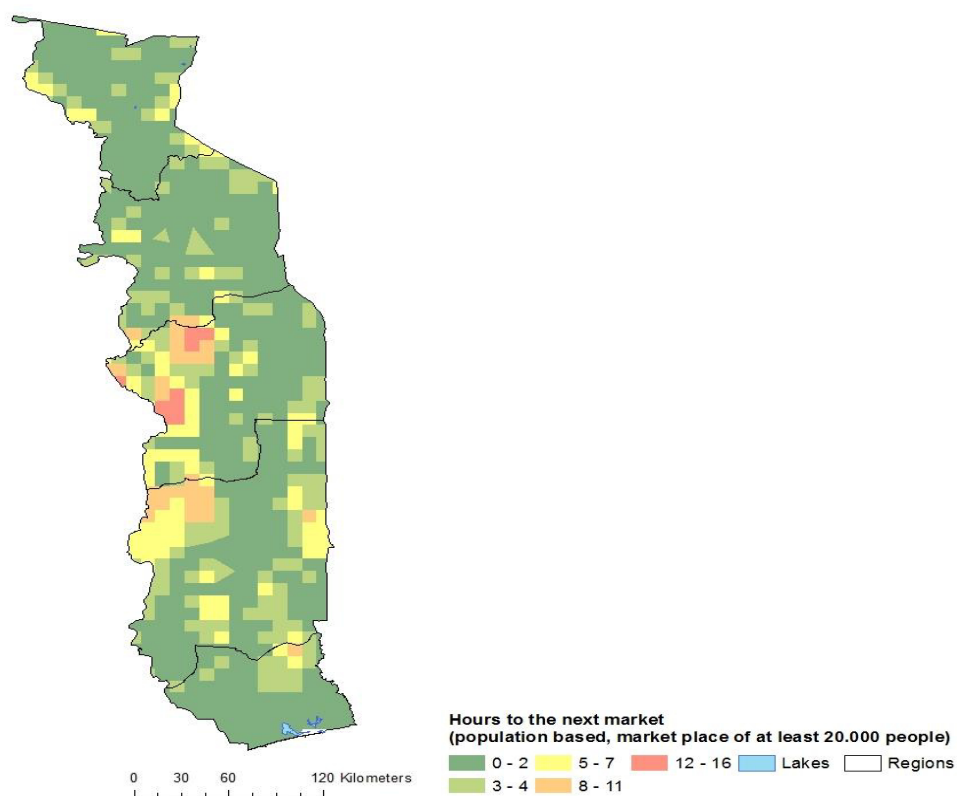
⁹ GHI score Values less than 5.0 reflect low hunger, values from 5.0 to 9.9 reflect "moderate" hunger, values from 10.0 to 19.9 indicate a "serious" level of hunger, values from 20.0 to 29.9 are "alarming," and values of 30.0 or greater are "extremely alarming" (von Grebmer *et al.*, 2014).

Based on this approach, investments into the agricultural and food sector of Togo are unlikely to have a significant effect on food and nutrition security improvements in the country. Overall, the economic, political, and social/nutrition framework in Togo does not seem to suggest increasing investments into the agricultural and food sector of the country.

Nevertheless, there are areas of potential in the agricultural sector, which include the large land area still not cultivated. Currently, only 45% of the 3.4 million cultivable hectares are under cultivation. There is high potential for rice production: an estimated 86,000 ha of land is suitable for irrigation and a total of 185,000 ha of lowlands is usable for rice production, but only 29,000 ha of that total has actually been developed.

The selection of which value chain to focus on is also determined by market access, i.e., transport intensive products should be promoted in areas that are well connected to markets, whereas remote areas should focus on low volume and livestock value chain segments. Figure 5 presents the average time (number of hours) it takes to reach the nearest market place of at least 20,000 people in Togo.

Figure 5: Distance to markets



Data sources: Hours to next market - HarvestChoice, 2015;

Administrative areas: <http://www.gadm.org>, accessed 20.9.2015

Inland water bodies: <http://www.diva-gis.org/gData> (water bodies), accessed 20.9.2015

2 Most relevant value chains in the country

2.1 GIC value chains

2.1.1 Groundnut

Groundnut is one of the main leguminous crops in Togo. Groundnut farming is practiced in all regions of the country, but production is more developed in the northern regions of Savanes and Kara, which provide three quarters of the national output. The region of Plateaux is also another important production area for the crop. Groundnut production increased from 25,976 tons in 2000 to 40,663 tons in 2014 (FAOSTAT, 2017) and most of production is consumed locally and processed through informal channels.

2.1.2 Cashew

Large-scale cashew production in Togo started in 1960, with the introduction of collective fields managed by the *Sociétés Régionales d'Aménagement et de Développement* to supply the parastatal company Togofruit. Following the closure of these companies, the industry went through a latent stage until the creation of a private nut processing plant in Tchamba, Cajou Espoir in 2004. According to the first census of farmers and cashew plantations in Togo (2015), the cashew value chain comprises 18,262 producers (9.6% are women), spread unequally over the four cashew producing regions. The Central Region and the eastern part of the Plateaux region, where more than 81% of producers are located, account for 7523 and 7391 producers, respectively. In terms of area dedicated to the cultivation of cashew, the same two regions have more than 86% of farms, with 9,643 ha for the Plateaux against 6,448 ha for the Central Region. The plantations consist mainly of small orchards, 46% have an area of about 0.5 ha. In the recent 2013/2014 crop year, the total production of cashew nuts in Togo was estimated at 6,268 tons of which over 89% came from the Central and the Plateaux Regions.

There is increasing interest in reviving the cashew industry in Togo since the sector has huge potential for job creation at either the production, processing or marketing level. The establishment of the processing plant Cajou Espoir is one such example. The company employed about 40 women who processed 12 tons of cashews in 2005. In 2014, it employed about 700 people, 75% of which were women, and processed about 2,400 tons of cashews. But in terms of exports, most of the raw nuts are exported to India while most processed white nuts are sold to partners in the United States and the European Union (Ministère de l'Agriculture, de l'Élevage et de l'Hydraulique (MAEH), 2015).

2.1.3 Soybean

Soybean cultivation has long remained marginal despite various development projects in the West African region at large. In the years between 1990 and 2000, soybean had been promoted through NGOs and Christian missions for the purpose of improving diets, especially for children. With the decreasing availability of cottonseed for processing into oil and sharp price spikes due to cottonseed meals shortages, soy is becoming a crop of high interest for farmers and millers. Soy is easy to produce and does not require much input investment (Dugué, 2010).

Soybean farming in Togo has led to some women boosting their income by cooking and selling soy-based products (e.g. doughnuts or tofu) in their communities. Togo has a service provider and producer organization (SPPO) known as Soja Nyo, an innovative mechanism that includes small producers in the soy supply chain. A French company, Jules Brochenin SA, in partnership with Label d'Or, is implementing a project aimed at producing and supplying quality organic soybeans in Togo. In 2014, they had about 2,783 smallholder producers working on 3,072 ha, and obtained a yield of 6,620 tons of organic soybean. With support from the programme Cadre Intégré Renforcé, the government of

Togo recently launched an ambitious project to improve the production of soybean for the period of 2015 to 2017. The project aims to contribute to increased export earnings and revenues from soy.

2.2 Other relevant value chains

The other relevant value chains besides those selected for the GICs are discussed in this subsection. In this case, relevance is based on, among other things, the extensive review of available literature on the crop, the importance of the crop in relation to share of area cultivated (harvested), production volume, and trade importance (import and export).

2.2.1 Cassava

In terms of cultivation area, cassava is the fourth most produced food crop in Togo after maize, sorghum and paddy rice, but ranks first in terms of quantity produced (see Table 6). Cassava production provides a good alternative strategy in cropping systems: cassava cultivation is possible on depleted soils, it does not require phytosanitary treatment or extensive care, and it is adopted in the framework of cultivated fallow system (Commission Nationale de la Coopération Décentralisée, 2013). Cassava and its derivatives are a main staple food in Togo and for many African countries. The Maritime, Central and Plateaux regions are the major growing areas. Cassava is cultivated on an area of 150,000 ha, and production has been steadily increasing from 700,697 tons in 2000 to 1,153,109 tons in 2014 (FAOSTAT, 2017). The significant growth in recent years can be attributed to the Togolese government's effort to boost the production of the crop through the implementation of the Project for the development of Root and Tuber Plants by the Ministry of Development in 2009. The project, co-financed by the government and partners such as the Banque Populaire pour l'Épargne et le Crédit, cost nearly one and a half billion FCFA¹⁰ (roughly 2,286,700 euros) and aimed at boosting cassava, yam and potato value chains, while working to reduce youth unemployment by integrating youth into the chains, organizing them into farmer groups and giving them access to credit (Akinochi, 2014).

2.2.2 Yam

Yam is the second most produced tuber in Togo. It is highly valued and an integral part of eating habits of Togolese households. Yam is celebrated in some communities (prefecture of Bassar and Ogou) as a traditional meal. The central region alone provides nearly 50% of national production. Yam production has been on the rise. Output rose from 563,286 tons in 2000 to 786,394 tons in 2014 (FAOSTAT, 2017). Yam is consumed boiled, fried, or crushed into "Fufu". Due to its large volume and low market value, yam is one of the least traded goods internationally. Some yams are exported to small ethnic markets in Europe and America.

2.2.3 Maize

Traditionally grown only in the southern regions of Togo, maize is now grown in the northern regions as well. Maize is one of the most important crops in Togo because it contributes to food security while providing economic revenues for farmers. Maize production stood at over 833,000 tons in 2014 with an annual growth rate of almost 4% since 1993. Annual area harvested and yield growth rates were 3% and 0.71% respectively for the same 20-year period (FAOSTAT, 2016), which means that cultivated areas are constantly increasing. In regions with two rainy seasons, corn facilitates the establishment and development of cotton (the main source of cash income) in a dual agricultural system well suited to this rainfall regime. For regions with one rainy season, corn appears to be a suitable crop because of the shortening of the rainfall cycle and because of low production of sorghum and millet, due to reduced soil fertility, particularly in the savannah region (Djagni, 1995).

¹⁰ FCFA = Franc des Communautés Francophones d'Afrique

2.2.4 Sorghum/Millet

Sorghum is widespread in the region of the Kara and Savannah and is grown primarily for the manufacture of a local drink called "tchoukoutchou". It is the second most produced cereal in quantity after maize (Danklou, 2006). Average production for the past 20 years amounts to almost 190,000 tons, and the crop is often associated with millet in the farming regions. Millet is only grown marginally, with a total output of about 39,700 tons in 2014.

2.2.5 Coffee/Cocoa

Coffee and Cocoa were introduced in Togo in 19th century colonial times by the Germans. Due to rich soils and a favourable climate, coffee and cocoa plantations were created in Kpalimé, Atakpamé and Badou in the Plateaux regions. Coffee is grown on an area of over 40,000 ha, while Cocoa farms extend over 30,000 ha (Ibid). Both crops constitute cash crops for farmers in the country despite the relatively small quantities produced at the national level. Production of coffee and cocoa in 2013 was 10,950 tons and 15,000 tons, respectively.

2.2.6 Cotton

Cotton is the main cash crop generating substantial revenues for producers. In recent years however, limited access to fertilizers and steady decline in cotton prices are either forcing farmers to grow alternative crops such as maize or groundnut or to expand their activities to livestock rearing in order to maintain their livelihood (Danklou, 2006). Cotton production has been on the decline for the past decade, with a decrease of output from 71,000 tons in 2003 to 24,300 tons in 2013. The main production areas are the Plateaux and Savanes regions.

2.3 Promising agricultural products and value chains

In addition to assessing the returns on investments into institutional innovations in Togo, analyses are also undertaken in order to choose the most promising value chains in the country. This analysis is important because it provides an objective indicator for priority value chains that would have the highest returns on investments into technological and institutional innovations. The trio objectives of PARI (to promote and support the scaling of proven innovations in the agri-food sector; to support and enhance investments in the GICs through research; and to contribute to the development of the agri-food sector in Africa and India through the identification, assessment and up-scaling of innovations) guide the selection of indicators. The indicators should thus focus on improving the food and nutrition security, reducing poverty and improving the market participation of the small holder farmers. Taking into account the availability of data and the purpose of the study, four indicators that focus on poverty and market potential are used to select the five most promising agricultural products from the long list of agricultural products that the country produces and sells. These indicators are:

1. Trade potential (Revealed Comparative Advantage (RCA) index): computed to identify value chains over which the country has revealed, albeit may not necessarily potential, comparative advantage in the export market. The revealed comparative advantage is an index used in international economics for calculating the relative advantage or disadvantage of a certain country in the production and export of a certain class of goods or services as evidenced by trade flows. It is based on the Ricardian comparative advantage concept. We use Balassa's measure of RCA to determine the competitiveness of selected agricultural products in overseas export markets. In the present case, the RCA index compares the share of a given agricultural product in the country's export basket with that of the same product in total world exports.
2. Yield gap: used to assess the expected return of the envisaged investment on the given country value chains. The yield gap of a crop grown in a certain location and cropping system is defined as the difference between the yield under optimum management and the average yield achieved by

farmers. A standard protocol for assessing yield potential and yield gaps is applied for some crops based on best available data, robust crop simulation models. It is a powerful method to reveal and understand the biophysical opportunities to meet the projected increase in demand for agricultural products.

3. Average yield growth: used to examine the potential of the product for poverty reduction. The most widely used indicator of crop productivity is production per unit of land (also referred to as crop yield). Average yield growth may reduce poverty in the following ways: (1) higher yield implies higher surplus product that could be sold in the market and thereby increase farmers income, (2) higher surplus product mean large quantity of food supplied to urban and rural market at a relatively lower price which in turn reduces urban and rural food poverty, (3) higher agricultural productivity will stimulate growth in the non-agricultural sector through its strong backward and forward linkage. For example, it boosts growth in the industry sector by freeing agricultural labor and reducing urban wage pressure (Lewis, 1962), and (4) agriculture's fundamental role in stimulating and sustaining economic transition, as countries (and poor people's livelihoods) shift away from being primarily agricultural towards a broader base of manufacturing and services (DFID, 2004).
4. Total production of the crop as a share of total supply (production + imports) is also used to assess the relevance of investing on that crop. Because it signals whether the agro-ecological system is suitable for the production of that crop in meeting the global demand for that particular crop. The ratio of production to total supply also illuminates the degree of integration of the producers that particular crop, small holder farmers in most African countries cases, into markets. The extent to which small holder farmers are able to participate in both input and output markets, and the functionality of those markets, are key determinants of their willingness and ability to increase marketable surpluses (Arias, 2013). Across the developing world, smallholders farm in diverse agro-climatic systems which together with their assets and skills, shape their economic lives. Markets and the extent to which they are functioning well, also play a determining role.

Note: The share of production of that particular crop over the total crop production is another key indicator considered in this study while assessing the relevance of investing on a particular crop in a country. This indicator is used as an eliminating criterion. If the share of a given crop out of total crop production is less than 0.5 %, we consider it as less relevant and exclude from the list of most promising value chains.

The summary of the five most promising value chains based on the RCA index, average yield growth and relevance of crop is reported in Table 11 below. The production share, RCA index, actual yield growth and relative yield gap for the GIC value chain(s) is also reported at the bottom of the table, when they are not included in the list of the first five most promising value chains.

Table 11: Selection of promising agricultural products /value chains

Rank by RCA			Rank by yield progress**		Rank by relevance of crop	
Rank	Name of agricultural product	RCA index (2011)*	Name of the crop	Average annual yield growth (2005 to 2012)	Name of agricultural product	Production share of supply (2011)*
1	Cocoa, beans	32	Sweet potatoes	26	Cottonseed	146
2	Cake, cottonseed	15	Seed cotton	7	Nuts and products	117
3	groundnuts	14	Sorghum	3	Cassava, products	115
4	Flour, roots and tubers	5	Rice, paddy	3	Cocoa Beans	111
5	Sesame seed	2	Groundnuts, with shell	1	Yams	103
	Cashew nuts, with shell	1.04	Soybeans	0.28	Soybeans	100
	Cake, soybeans	0.00	Cashew nuts, with shell	-0.13	Groundnuts (Shelled)	100

Source: *Own computation based on FAO 2015 data.

Note: **a minimum of 0.5% production (volume) share threshold is used as a screening (crop relevance) criteria.

Results of assessment (Table 11):

- The trade potential (RCA index) is above 1 for cocoa beans, cotton seed, groundnuts (GIC selected value chain), roots and tubers, and sesame seed. This indicates that Togo has a comparative advantage in the export of these commodities. The RCA value for one of the GIC selected value chain, cashew, is also above 1, once again unveiling the country's revealed comparative advantage in the export of cashew. On the other hand, the revealed comparative advantage index for the other GIC-selected value chain, soybean, is less than 1, indicating that Togo has a comparative disadvantage in the export of these crops;
- In Togo, the average yield progress of all the relevant crops (those that satisfy the 0.5% production volume share) except sweet potatoes¹¹ was either modest or dismal over the CAADP period (2005 to 2012). In relative terms, the yield performance indicating progress suggests that sweet potatoes and cotton seed are the most promising crops in Togo. The GIC-selected value chains experienced a dismal yield growth performance;
- In terms of relevance (production share of supply) the leading products are cottonseed, nuts and products, cassava and products, cocoa Beans and products and yams. The total production of all of these products meets the total demand. The total supply of two of the GIC-selected products (soybeans and groundnut) is domestically produced.

2.4 Summary on the selection of agricultural products and value chains

This chapter (chapter 2) has presented different relevant and important value chains in Togo based on different criteria, which resulted in the selection of different value chains. In summary, the three top value chains – GIC selected value chains, other relevant value chains, and those identified by analysis of promising agricultural products and value chains – are presented in Table 12. The summary table

¹¹ The average yield growth of sweet potatoes would have been only 6%, had the 2005 yield growth, which is 145%, not been truncated.

shows that only one of the GIC-selected value chains (groundnut) is identified as promising by the analysis of promising agricultural products and value chains. However, a number of overlaps in the value chains is shown between the analysis of promising agricultural products and value and the literature review. These products/value chains are cassava, sorghum, cocoa and cotton.

Table 12: Summary of all value chains

GIC value chains	Other value chains	Promising agricultural products and value chains (top 3)		
		RCA	Yield progress	Relevance of crop
Groundnut	Cassava	Cocoa, beans	Sweet potatoes	Cottonseed
Cashew	Yam	Cake, cottonseed	Seed cotton	Nuts & products
Soybean	Maize	Groundnuts	Sorghum, Rice paddy	Cassava, products
	Sorghum/Millet			
	Coffee/Cocoa			
	Cotton			

Source: Authors' compilation

3 Innovations in value chains in the past 20 years

3.1 Main limiting factors

The limiting factors include:

- Decline total agricultural R&D spending in Togo;
- Only a very limited amount of the funding ITRA receives from the government is allocated to actual research programmes; ITRA is therefore highly dependent on unstable donor support (Stads *et al.*, 2014);
- Weak extension and advisory services;
- Low productivity in smallholder farming systems.

The cashew sector, much like many other crops in general, is confronted to the following main problems:

- Lack of organization of the value chain and its actors;
- Lack of formal business relationships between actors;
- Poor control of good agricultural practices;
- Lack of improved plant material;
- Difficult access to financing;
- Aging and neglect of orchards planted by Togofruit.

Other structural and social constraints include limited access to land for some producers, especially women, lack of market regulations and policies to boost the sector and low levels of technical and economic knowledge and research, specifically on cashew (MAEH, 2015).

3.2 Important value-chain related and cross-cutting innovations

In this section, we describe some of the key innovations that have been initiated in selected value chains in Togo in the last 20 years. The described innovations are considered significant or beneficial because of widespread adoption, proven positive impact on increasing productivity, increasing incomes, adapting to the environmental challenges (such as drought), creating employment etc.

3.2.1 GIC value chains

In Togo, SPPOs are a new type of grouping that have been established with support from the Centre International de Développement et de Recherche, to enable small producers to gain sustainable access to high value markets by involving them in strategies and decisions about what happens downstream in the supply chain (Pernot du Breuil and de Romémont, 2008). A well-known example of such SPPO in Togo is *Soja Nyo*. Benefits from membership in the SPPOs for producers include higher and secure income, and better nutrition. It enables farmers to stock food products and sell them when prices are higher. It has also improved their social capital.

Cashew

So far, the Farmer Business School (FBS) approach is the main support tool for cashew producers in Togo. This approach was originally developed in 2009 in the context of the cocoa economy through a partnership between the *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ), the German development agency, and the Bill and Melinda Gates Foundation. It was then adapted to the cashew sector by extension services ICAT, the Rural Development Program, ProDRA and other partners. The FBS approach aims to develop the entrepreneurial and basic business skills of farmers, and educate them on market opportunities and ways to improve productivity, family income and nutrition. FBS provides the producers with good practices on different aspects of cashew production and management tools for their associations. The implementation of the approach is done by ICAT and other organizations such as the Togo's farmers' Movement and the Regional Union of Grain Producers Organizations, with the support of the GIZ-ProDRA. Togo currently has a pool of 35 trainers for cashew FBS. More than 1,000 cashew producers, 21% of which are women, have been trained since 2013 (MAEH, 2015).

3.2.2 Other value chains and cross-cutting innovations

- **2 SCALE project**

The 2 SCALE¹² project, which was funded by the Netherlands government and implemented jointly by International Fertilizer Development Center, International Centre for development oriented Research in Agriculture and Base of the Pyramid Innovation Center, created a domestic market and value chain for yellow maize to reduce importation of yellow maize for poultry feed in Togo. In the 2 SCALE project, poultry producers buy grain from maize farmers, and sell poultry manure back to the farmers as organic fertilizer. The project has created new income streams for small-scale maize farmers, and helped poultry producers stay in business despite a dramatic increase in feed costs. For instance, in 2009, maize farmers involved in the project sold 114 tons of yellow maize to poultry producers, earning revenues of € 26,000. In 2012, they sold 300 tons, earning over € 70,000.

- **Promotion of Science and Technology for Agricultural Development (PSTAD) project**

CORAF/WECARD created maize value chains in Togo within the PSTAD project with technical backstopping by the International Institute of Tropical Agriculture. Maize was the selected crop because of its importance to food security as the region's main staple food crop and its importance as a major source of producers' incomes.

- **Other innovation projects**

Innovation projects have also been undertaken for several other crops to improve their resistance to disease and climatic conditions, to increase yield and nutritional quality, or for integrated soil management purposes. These improved crops are varieties of sorghum, rice, cassava, yam, etc. Additionally, improved production technology of yam setts, rapid multiplication of cassava, improved fallow with legume cover (*Mucuna*, *cajanus* pigeon), manufacture and use of mineral and organic fertilizers based on identified deficiencies and various types of culture technologies and practices were

¹² www.2scale.org

developed. Processing efforts such as moringa-fortified food, processed yam, maize and cassava flours, cheese, jam, tomato juice, and sparkling palm wine (DEHACHAMPE) production can be highlighted (Bonfoh et. al., 2016).

- **Service provider and producer organizations**

SPPOs are considered one of the most promising approaches to support innovation. By facilitating the grouping of framers, SPPOs give small producers a better understanding and access to high value markets. SPPOs also enable a greater collaboration between actors along the value chain. In addition to SPPOs, FBS have also had a positive impact on farmer's livelihoods wherever they were implemented. With increased skills in business and management, producer associations are better equipped to effectively play their role in the sectors they are involved in. Hence, these approaches, along with new agricultural technologies dissemination efforts undertaken by other extension services, provide ground for improving smallholder farmers' living conditions and revenues.

Another promising approach to enhance innovation in Togo is IPs. They have indeed contributed to improving access to inputs, efficient production technologies, crop products, and have created added value for the benefit of the different links of the developed value chains, particularly for small farms. The integration of organic matter, including poultry manure, allows producers to triple the productivity of their maize plots (2 tons / ha to 6.2 tons / ha by 2018). We note an improvement in yields, which producers intend to increase further. The platforms have enabled some producers to benefit from investment credit of over 19 million FCFA from the Group of Savings and Credit Banks of Village Associations microfinance, and numerous training courses on management and cooperative agricultural enterprises.

The milk platform has enabled stakeholders to benefit from various training and capacity building initiatives. In terms of production, the demand for raw material (milk) has increased significantly to reach a capacity of 100 liters daily. Revenues from cheese sales have helped meet the social, health, educational needs of women, and to empower them within their households. The market is currently being extended to Benin. Furthermore, platforms enable members to have access to microfinance institutions and companies that sign purchase contracts with them through the platforms. Others saw their numbers grow over time because of the services provided to members.

The challenge for IPs is to remain functional after the funding from partners ends. Hence, efforts to establish long lasting functional IPs need to take into account:

- A well identified entry point;
- A good organization of stakeholders;
- Openness to new technology
- The existence of a well-targeted market;
- Contractual sales;
- Technical and financial support;
- Respect of sales contracts;
- A strong market demand (Bonfoh et. al., 2016).

4 Suggestions for collaboration

Efforts that will yield good agricultural innovation in Togo should pay attention to the issues of:

- Low productivity of the smallholder system, which can be addressed through the generation, the dissemination and the use of new and improved production technologies. This will call for strong support of the research system to generate the needed technologies;

- The development of effective agricultural input delivery systems to meet the demand of smallholders;
- The development of an efficient policy system that engages all stakeholders in developing supportive policies for trade within and outside the country;
- Encouraging sustainable market orientation and the establishment of economic structures, such as producer cooperatives, supply contracts, and business services.

The innovation systems approach should be entrenched as the main mode for implementing agricultural R&D activities.

There is scope for a fruitful partnership and collaboration between the countries of Germany and Togo. The partnership should include building relationships with the Ministry of Agriculture, Livestock, and Waterworks; Research institutions (ITRA, Universities); Development institutions (ICAT); farmers' organizations; civil societies; non-governmental organizations and the private sector.

Partnership opportunities in specific areas could include:

- **Value addition and conservation of products:** Germany's technical know-how can be used along with local indigenous knowledge in order to encourage the processing of local products.
- **Productivity, soil fertility management and mitigation of the effect of climate change:** In light of the evidence of declining soil fertility, particularly in the North of the country, collaboration in these areas can help reverse the situation, therefore increasing the yields of crops that feed heavily on soil nutrients, such as cassava and maize. The help here will focus on finding ways of increasing soil fertility by use of cost-effective and environment-friendly techniques adapted to local conditions.
- **Capacity building:** capacity can be built through training farmers, students and technicians in the fields of crop production, business, management, food technology and processing.
- **Policy:** Policy development for certain agricultural sectors can be informed by the results of collaborative agricultural projects in Togo.

Some specific projects already initiated in some of the above-mentioned areas are:

- **GIZ:** Pineapple and poultry value chains in the Coastal region, coffee-cocoa in Plateaux Region, cashew in the Central region; training on agricultural entrepreneurship, training field.
- **FARA:** Concept of Integrated Agricultural Research for Development (IAR4D); dissemination of technologies and agricultural good practices, promotion of IPs.
- **CORAF/WE CARD:** Promotion of crop integrated management technologies.

Future research efforts must be aligned with national policies for agricultural development and take into consideration the different sectors defined as key sectors by the Togolese government. PNIASA mentions areas such as plant industry, animal and fish production, institution strengthening and sector coordination, and agricultural capacity building. Furthermore, research that aims to create strategies to reduce poverty, food and nutrition insecurity, as well as the effects of climate change would prove important and essential, provided that they are adapted to the particular context of Togolese agriculture and the needs of the country's smallholder farmers.

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Annex A: Background Information on Nutrition

This annex provides background information on diet quantity and quality, child feeding practices and nutrition status (including micronutrient deficiencies) and definitions of the food and nutrition security indicators presented in Chapter 1.4.2.

Background on food and nutrition security

Diet quantity: Dietary energy supply per capita is an indicator of diet quantity that can be gauged against a population's average dietary energy requirement. The data are based on FAO's food balance sheets that estimate the quantity of each food item available for human consumption at the national level. It has to be emphasized that supply does not equal intake: Supply includes food that households feed to domestic animals or pets and food that they waste. Also, a sufficient average supply of dietary energy (or a nutrient such as protein) may leave those parts of the population deprived that have greater-than-average requirements or lower-than-average intakes. Indicators of undernourishment and food over-acquisition seek to consider the distribution of dietary energy consumption in the population and the minimum/maximum requirements of the average individual in a country (Cafiero, 2014).

Diet quality: Assessing diet quality requires a look at the composition of the diet. In the absence of national food consumption surveys for most countries, data from FAO's food balance sheets are used. The percentage of dietary energy supply from starchy staples (cereals, roots and tubers) is a rough indicator of diet quality: generally, the higher this percentage, the lower the micronutrient density of the diet; starchy staples are rich in carbohydrate and good sources of dietary energy, but they are usually not very micronutrient-rich. Non-staple foods are important for micronutrient and protein supply: Foods of animal origin are good sources of high-quality protein and vitamin A as well as highly bioavailable iron and zinc (meat, fish) and calcium (milk, small fish eaten whole with bones). Pulses and nuts are also good sources of protein and micronutrients. Fruits and vegetables provide a range of micronutrients while generally contributing little dietary energy (USDA, 2016).

The shares of dietary energy supply from carbohydrate, protein, and fat roughly indicate whether the diet is balanced in terms of its macronutrient composition. The recommended shares of dietary energy are 55-75% for carbohydrate, 10-15% for protein, and 15-30% for fat (WHO, 2003). It should be noted that these shares do not reveal whether dietary energy supply per capita and average protein supply are insufficient, sufficient, or excessive in absolute terms. A diet that meets the average dietary energy requirement for Africa as a whole (2200 kcal/day according to FAO, 2016) and provides 55-82.5 g protein per day and 36-73 g fat per day contains the recommended shares of 10-15% of dietary energy from protein and 15-30% of dietary energy from fat. For an adult weighing 60 kg, a protein intake of 50 g/day is considered sufficient, and 60 g/day for an adult weighing 75 kg. No safe upper limit of protein intake has been established, but it is unlikely that intakes of twice the recommended level pose any risk (WHO/FAO/UNU, 2007).

Child feeding practices: Feeding practices are determined by local food availability and household access to food, but also by maternal knowledge and care. Breastfed and non-breastfed children aged 6-23 months should eat foods rich in iron (meat, fish, or eggs) and fruits and vegetables rich in vitamin A daily, and consume at least 4 out of 7 food groups every day (PAHO/WHO, 2003; WHO, 2005; WHO, 2010).

Nutrition status: Household food security, the health environment, and mothers' caring capacity influence children's dietary intakes and the risk of infection, and thereby their nutrition and health status (UNICEF, 2013). Wasting, or acute undernutrition, is the result of recent rapid weight loss or the failure to gain weight that is caused by inadequate diets or infection. Stunting is the failure to grow adequately and results from chronic or recurrent undernutrition or infection (UNICEF/WHO/World Bank, 2016). Stunting in early childhood can have irreversible consequences, such as impaired motor and cognitive development, shorter adult height, lower attained schooling, and reduced adult income, whereas wasting carries a higher mortality risk (Victora et al. 2008; Black et al. 2013; Olofin et al. 2013). Overweight in children and overweight and obesity in adults occur when dietary energy intakes exceed

dietary energy requirements. Overweight and obesity increase the risk of noncommunicable diseases (UNICEF/WHO/World Bank, 2016).

Micronutrient deficiencies arise from insufficient intakes or absorption of essential vitamins and minerals. Major causes are poor diets, diseases, and increased requirements during life stages such as early childhood, pregnancy, and lactation. Micronutrient deficiencies are not limited to poor populations with inadequate dietary energy intakes, but may coexist with overweight and obesity in individuals and communities. Measuring micronutrient deficiencies poses challenges: There is often a need to resort to proxy indicators and large data gaps persist. Anemia, for example, is used as a proxy indicator for iron deficiency, although only about half of the global burden of anemia can be attributed to iron deficiency. Iron deficiency anemia impairs cognitive and motor development, causes fatigue and low productivity, and may result in low birth weight and increased maternal and perinatal mortality if pregnant women are affected (WHO 2015b). Whenever survey data on anemia prevalence are not available, modeled estimates from WHO (2015b) are used. Vitamin A deficiency increases the risk of vision problems, infectious diseases, and death among children (Imdad et al., 2010). Without exception, the data on vitamin A deficiency that are presented in this dossier are modeled estimates (Stevens et al., 2015, quoted in IFPRI, 2015).¹³

Table A1: Cutoffs to identify nutrition problems of public health significance in children

Category of public health significance	Stunting	Wasting	Overweight	Iron deficiency anemia
Severe	≥40	≥15	≥10	≥40
Moderate	30-39	10-14	5-9	20-39
Mild	20-29	5-9	3-4	5-19

Source: Adapted from World Bank (2006) and based on data from WHO (1995) and WHO (2000)

Notes: The cutoffs for public health significance were applied to prevalence rates of stunting, wasting, overweight and iron deficiency anemia (estimated from anemia prevalence) that were rounded to the first decimal. In the tables in Chapter 1.4.2, the data have been rounded to integers, which may lead to seeming contradictions: In a region where 29.8% of children under five were stunted (30% if rounded), stunting would be considered a mild public health problem, and in a region where 30.3% of children under five were stunted (also 30% if rounded), stunting would be considered a moderate public health problem.

Indicator definitions

Dietary energy supply: National average energy supply, expressed in kcal/caput/day (FAO, 2016).

Average dietary energy supply adequacy: Dietary energy supply expressed as a percentage of the average dietary energy requirement. Each country's average supply of calories for food consumption is divided by the average dietary energy requirement estimated for its population to provide an index of adequacy of the food supply in terms of calories (FAO, 2016).

Prevalence of undernourishment: Probability that a randomly selected individual from the population consumes an amount of calories that is insufficient to cover her/his energy requirement for an active and healthy life (FAO, 2016). This indicator seeks to estimate of the percentage of individuals in the population who are chronically undernourished because they fail to meet their minimum dietary energy requirements on a consistent basis.

Prevalence of food over-acquisition: Percentage of individuals in a population who tend, on a regular basis, to acquire food in excess of their maximum dietary energy requirements (FAO, 2016).

Dietary energy supply from cereals, roots and tubers: Percentage of dietary energy supply provided by cereals, roots and tubers (FAO, 2016). A higher share of dietary energy supply from cereals, roots and tubers is generally associated with a lower micronutrient density of the diet.

¹³ Iodine deficiency disorders are an important public health problem in many countries. They are not discussed here because salt iodization, the main prevention and control strategy, is not related to agricultural value chains.

Dietary energy supply from carbohydrate: Percentage of dietary energy supply provided by carbohydrates, calculated by subtracting dietary energy supply from protein and dietary energy supply from fat from 100%.

Dietary energy supply from protein: Percentage of dietary energy supply provided by protein, calculated as average protein supply times 4 kcal/g divided by total dietary energy supply.

Dietary energy supply from fat: Percentage of dietary energy supply provided by fat, calculated as average fat supply times 9 kcal/g divided by total dietary energy supply.

Average protein/fat supply: National average protein/fat supply, expressed in g/caput/day (FAO, 2016).

Minimum dietary diversity: consumption of 4+ food groups: Percentage of children aged 6-23 months fed four or more food groups in the 24 hours preceding the survey. The food groups are 1) infant formula, milk other than breast milk, cheese or yogurt or other milk products; 2) foods made from grains, roots, and tubers, including porridge and fortified baby food from grains; 3) vitamin A-rich fruits and vegetables (and red palm oil); 4) other fruits and vegetables; 5) eggs; 6) meat, poultry, fish, and shellfish (and organ meats); 7) legumes and nuts (ICF International, 2015, The DHS Program STATcompiler).

Consumption of foods rich in vitamin A: Percentage of children aged 6-23 months who consumed foods rich in vitamin A in the 24 hours preceding the survey. Foods rich in vitamin A include meat (and organ meat), fish, poultry, eggs, pumpkin, red or yellow yams or squash, carrots, red sweet potatoes, dark green leafy vegetables (for example, cassava leaves, pumpkin leaves, kale or spinach), mango, papaya, and other locally grown fruits and vegetables that are rich in vitamin A (ICF International, 2015, The DHS Program STATcompiler).

Consumption of foods rich in iron: Percentage of children aged 6-23 months who consumed foods rich in iron in the 24 hours preceding the survey. Foods rich in iron include meat (and organ meat), fish, poultry, and eggs (ICF International, 2015, The DHS Program STATcompiler).

Child wasting: Percentage of children under five who are wasted, that is, have weight-for-height below minus 2 standard deviations of the median of the WHO Child Growth Standards. This means that they are too thin for their height (UNICEF/WHO/World Bank, 2016).

Child stunting: Percentage of children under five who are stunted, that is, have height-for-age below minus 2 standard deviations of the median of the WHO Child Growth Standards. This means that they are too short for their age (UNICEF/WHO/World Bank, 2016).

Child overweight: Percentage of children under five who are overweight, that is, have weight-for-height above 2 standard deviations of the median of the WHO Child Growth Standards. This means that they are too heavy for their height (UNICEF/WHO/World Bank, 2016).

Adult overweight and obesity/overweight and obesity among women of reproductive age: Percentage of adults aged 18 years or older/percentage of women of reproductive aged 15-49 years whose body mass index (BMI) is equal to or greater than 25 kg/m² (WHO, 2015a; ICF International, 2015, The DHS Program STATcompiler). BMI is calculated by dividing body weight in kg by squared height in m.

Adult obesity/obesity among women of reproductive age: Percentage of adults aged 18 years or older/percentage of women aged 15-49 years whose body mass index (BMI) is equal to or greater than 30 kg/m² (WHO, 2015a; ICF International, 2015, The DHS Program STATcompiler).

Adult underweight/underweight among women of reproductive age: Percentage of adults aged 18 years or older/percentage of women aged 15-49 years whose body mass index (BMI) is below 18.5 kg/m² (ICF International, 2015, The DHS Program STATcompiler).

Vitamin A deficiency: Percentage of children aged 6-59 months with a serum retinol concentration below 0.7 µmol/l.

Anemia in children: Percentage of children aged 6-59 months with anemia, namely, a blood hemoglobin concentration below 11.0 g/dl.

Anemia in women: Percentage of women aged 15-49 years with anemia, namely, a blood hemoglobin concentration below 12.0 g/dl for non-pregnant women and below 11.0 g/dl for pregnant women.

ABOUT PARI

The Program of Accompanying Research for Agricultural Innovation (PARI) brings together partners from Africa, India and Germany to contribute to sustainable agricultural growth and food and nutrition security in Africa and India as part of the “One World, No Hunger” Initiative supported by the German government.



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