Agricultural dynamics and food security trends in Tanzania

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General introduction to the four DRA/ASC-AFCA Working Papers

From 'Tracking Development' to 'Developmental Regimes in Africa' and 'Agro-Food Clusters in Africa': further research questions

Between 2007 and 2012 the Netherlands Ministry of Foreign Affairs funded a research project to compare the long-term developments in Southeast Asia and Sub-Saharan Africa. Long-term meant: with a focus on the second half of the 20th century. The main research question was: how could countries, which were all having low levels of socio-economic performance in the 1950s, differ so much in economic performance in the following decades? The research team consisted of researchers from the Royal Netherlands Institute of Southeast Asian and Caribbean Studies (KITLV) and the African Studies Centre, both in Leiden, together with senior and PhD researchers in four Southeast Asian and four African countries, which were compared one-to-one: Nigeria with Indonesia, Uganda with Cambodia, Kenya with Malaysia and Tanzania with Vietnam[1]. One of the main conclusions drawn by project leaders David Henley (KITLV) and Jan Kees van Donge (ASC) was that the economic breakthrough in Southeast Asia can only be well understood if one looks at the massive state-led rural development campaigns from the 1960s onwards, which resulted in a major agricultural revolution and in generally successful rural poverty alleviation on a mass scale. This was much less so in Africa, where many political leaders in post-colonial governments have made different choices, neglecting the rural peasants and trying to implement an elite-based industrialization strategy that had disappointing results (Henley & van Donge 2012; Vlasblom 2013)[2]. The DfID-funded Africa Power and Politics Programme (APPP) came to a comparable conclusion, focusing on Africa's ruling elites: these elites exploited or ignored the rural masses and can be held responsible for economic stagnation and rampant poverty and hunger. The important scientific and policy question can then be asked: if Africa would put more emphasis now on its agricultural sector (like Southeast Asia did from the 1960s onwards), would it be possible to repeat the 'growth miracle' and combine an agriculture-based rapid growth strategy, with a successful poverty alleviation strategy, particularly in the rural areas?

Although these main conclusions were shared by most participants in the Tracking Development team, there is quite some controversy about the causal factors, and about more recent trends. Based on statistical evidence from FAO sources (FAOSTAT), four DRA/ASC-AFCA working papers deal with these dynamics and with recent trends and show that a) not all was gloomy in Africa's agricultural performance between 1960 and 2000, and that b) from about 2000 onwards major breakthroughs can be seen, suggesting that Africa's agricultural sector *is*

[1] Results of the Tracking Development project can be found in Berendsen, B., T. Dietz, H. Schulte Nordholt & R. van der Veen (2013), *Asian Tigers, African Lions. Comparing the Development Performance of Southeast Asia and Africa*, Leiden: Brill. The chapter most relevant to this working paper series is Dietz T. (2013), 'Comparing the agricultural performance of Africa and Southeast Asia over the last fifty years' (pp. 85-128). For Tanzania the most relevant chapters in that book are: Jan Kees van Donge, 'Differential supply responses to liberalization, and resultant poverty alleviation in Vietnam and Tanzania' (pp. 341-366), and Blandina Kilama's 'The Variation in output and marketing of cashew in Tanzania and Vietnam' (pp. 367-390).

[2] Henley, D. & J.K. van Donge (2012), *Policy for development in Africa: Learning from Southeast Asia*. London Developmental Regimes in Africa Policy Brief 01; Vlasblom, D. (2013), *The richer harvest. Economic development in Africa and Southeast Asia compared* (Leiden: African Studies Centre).

improving, or even that Africa is already experiencing an 'agricultural revolution', although a different one than Southeast Asia's "Green Revolution". The working papers focus on the four African case-study countries in the Tracking Development project: Nigeria, Uganda, Kenya and Tanzania. For each country four types of analysis are presented: (1) agricultural production trends in the 1960-2011 period, (2) food balance trends during this period, combining these agricultural food production data with data on trade and consumption, (3) high-growth agricultural products in the 2000-2010 period ('agricultural islands of effectiveness'), and (4) data on food security, based on child under-nutrition surveys, and (if available) trends. The working papers also include some relevant maps made available by the Centre for World Food Studies in Amsterdam. For each country, the working paper ends with suggestions for a follow-up research agenda and with a first inventory of useful sources, made by the ASC's library and documentation unit.

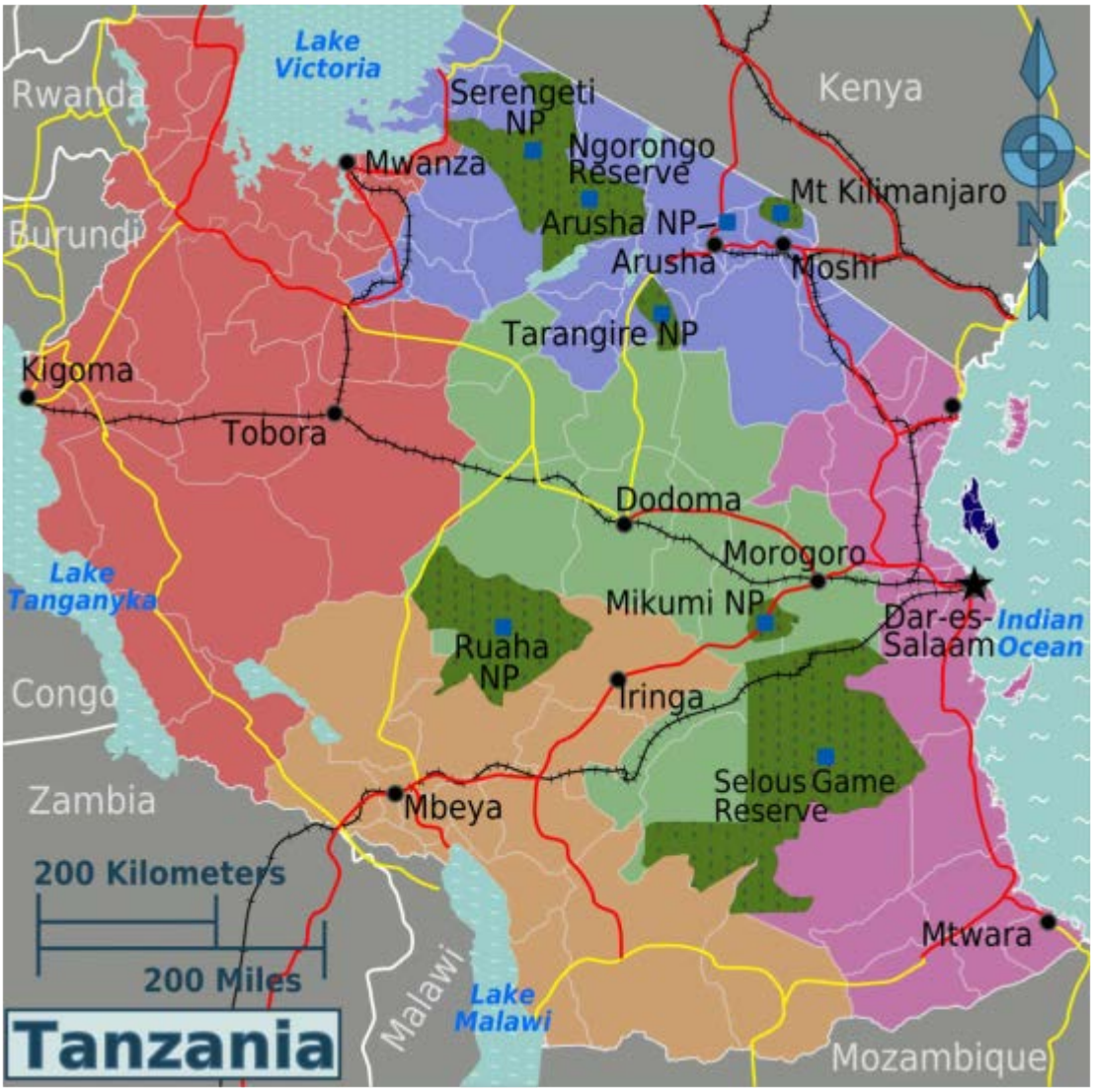
These four DRA/ASC-AFCA working papers are the first results of a Collaborative Research Group at the African Studies Centre in Leiden dealing with Agro-Food Clusters in Africa. Other studies will follow, both about these four countries and about other African countries. The research group intends to study four types of 'drivers of agricultural innovation breakthroughs and blockages': (i) urbanization and urban demand development for agricultural produce from relevant hinterlands; (ii) demand from elsewhere (for food, biofuels, and other export crops); (iii) business development and institutional arrangements in relevant value chains; and (iv) agricultural and rural development policies and practices. In the Tracking Development and APPP groups, the latter 'driver' received a lot of attention. In the ASC-AFCA team we tend to give due emphasis to the first driver of agricultural breakthroughs, which are currently happening all over Africa. We hope to be able to form research teams for particular agricultural products to do a detailed and, if possible, comparative (intra-African) analysis to determine the relative strengths of each of these four drivers of change for each of the 'agricultural islands of effectiveness' in the four countries and elsewhere in Africa.

One methodological remark should be made beforehand. Although FAO puts a lot of effort in its statistical data base, many researchers doubt the accuracy of these data. Some researchers even state that these data should not be used, and certainly not if one wants to compare countries. While acknowledging these caveats, in the Tracking Development project and in this DRA/ASC-AFCA follow up research (as well as in the broader ASC-AFCA project) we are convinced that the FAOSTAT data collected over the past 50 years represent a unique statistical resource and deserves to be explored and exploited as a *starting point* and possible background canvas for any discussion about food security trends in the case study countries. However: it should be triangulated with other sources and treated with caution.

1 Tanzania's agricultural dynamics, 1961-2011

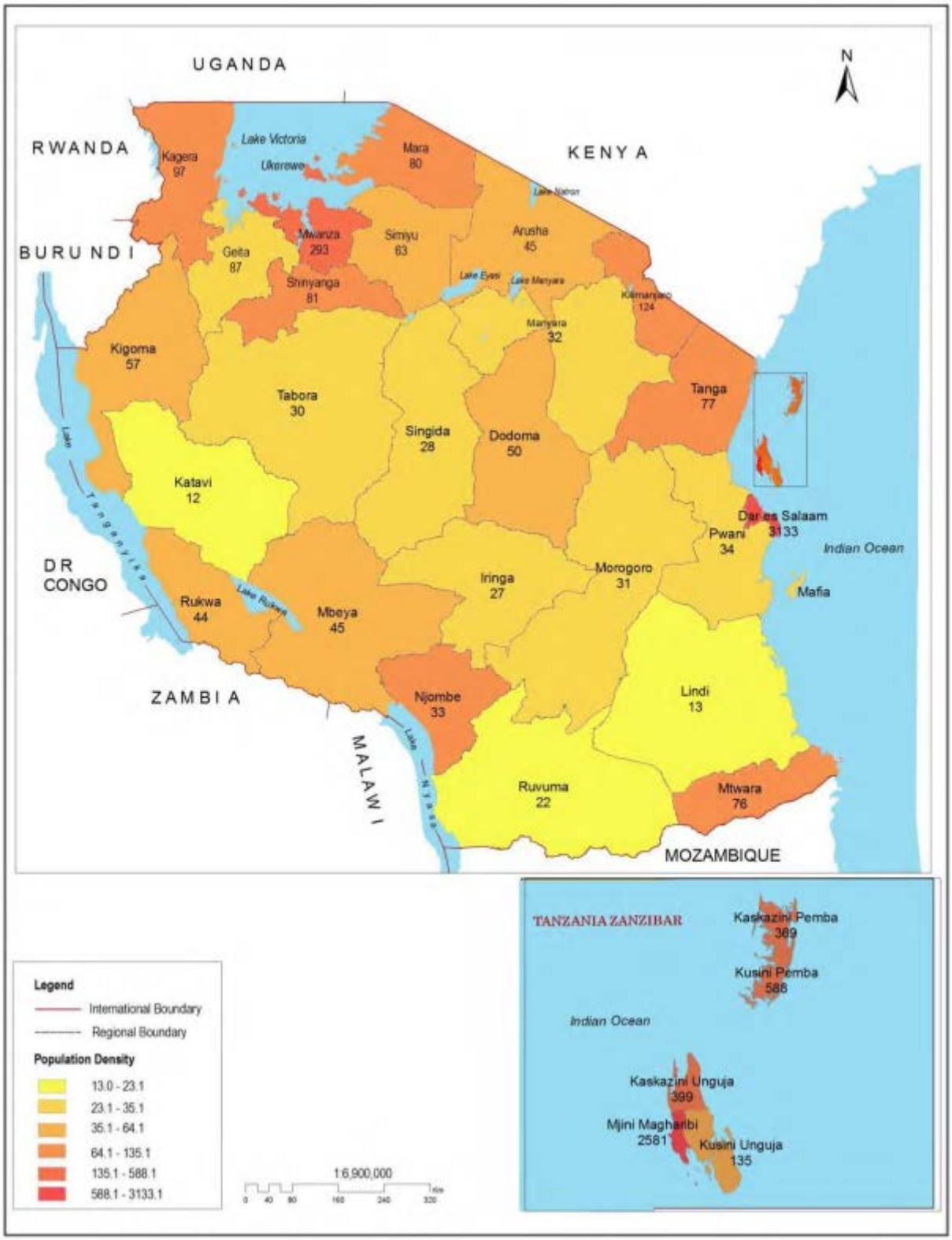
Tanzania currently has a population of 45 million inhabitants. The country experienced one of the highest population increases on earth during the last fifty years. Most of Tanzania is still sparsely populated, though, with the exception of areas in the north (near Lake Victoria, particularly Mwanza and Kagera and near Mount Kilimanjaro), on the islands of Zanzibar and Pemba and around Dar es Salaam and in an area in the southwest, near Lake Malawi (Mbeya) (see Figures 1, 2a and 2b). Tanzania's northwestern areas border very densely population areas in Burundi, Rwanda, Uganda and Kenya. Figure 3 shows the location of the major urban and peri-urban areas.

Figure 1: Tanzania's: administrative areas



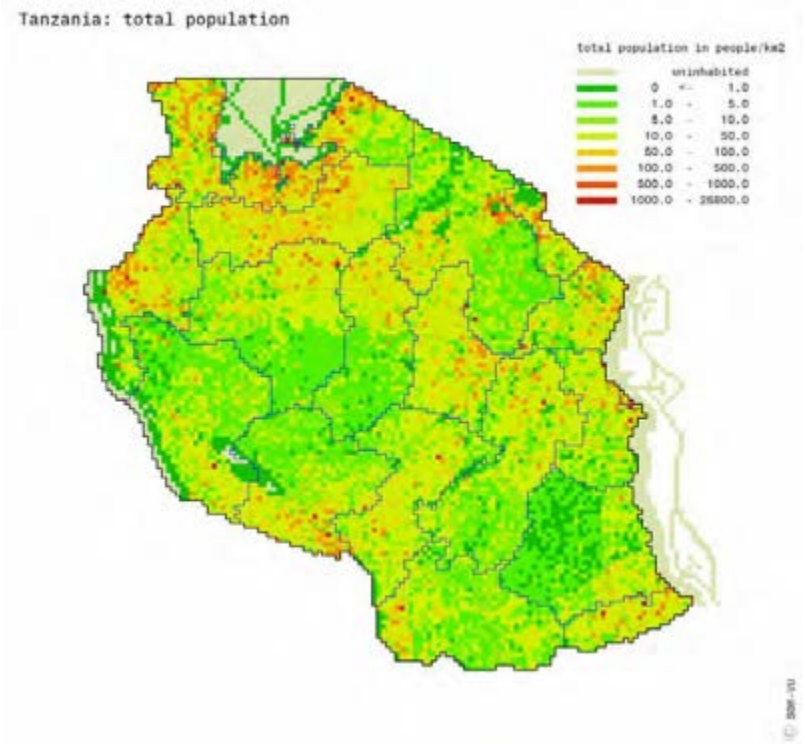
Source: http://upload.wikimedia.org/wikipedia/commons/1/16/Tanzania_regions_map.png
(last modified Nov. 1; 2013; map probably from 2008)

Figure 2a: Population densities in Tanzania in 2012



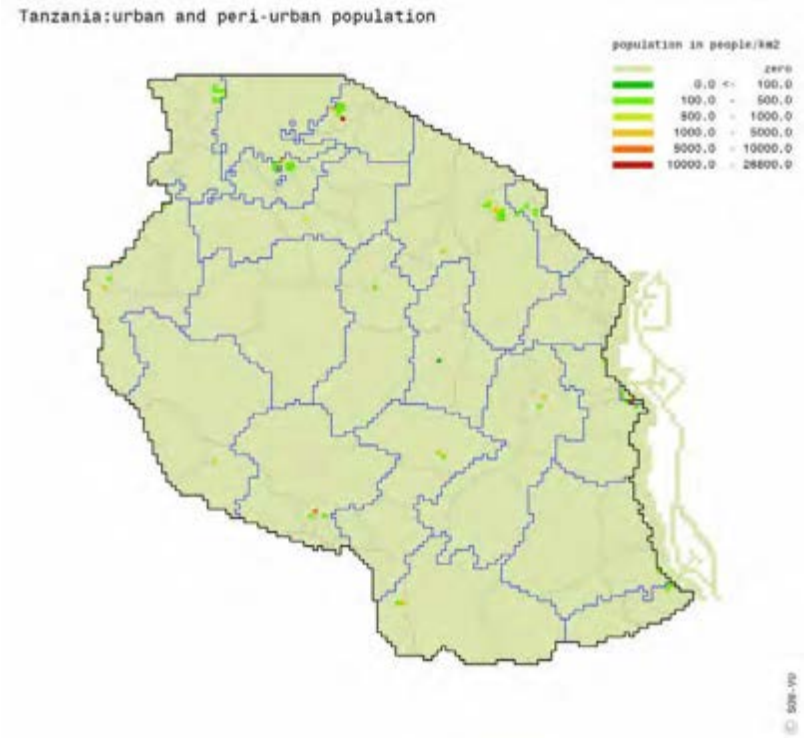
Source: NBS 2012 Population and Housing Census. Population by Administrative Areas (Dar es Salaam, March 2013), p. 7.

Figure 2b: Population densities in Tanzania, around 2005



Source: Van Wesenbeeck, C.F.A. & M.D. Merbis (2012), *Africa in Maps. Data repository of the food economy in Sub-Saharan Africa*. Amsterdam: Centre for World Food Studies

Figure 3: Urban and peri-urban areas in Tanzania



Source: Van Wesenbeeck, C.F.A. & M.D. Merbis (2012), *Africa in Maps. Data repository of the food economy in Sub-Saharan Africa*. Amsterdam: Centre for World Food Studies ('zero' = rural or water)

Tanzania's food production performance at the moment is fairly good. However, the country experienced many ups and downs. At independence in 1962, Tanganyika and Zanzibar (which were still separate political territories) could not feed their populations on the basis of its own basic food production at the level of WHO food requirements, although they were close, namely at 90-96% of the minimum requirements for a healthy life: 825,000 kcal/capita per year or 2260 kcal/day (assuming that basic staple food production would cover between 80% and 75% of requirements, while the rest would be covered by other foods). During the 1960s, the situation deteriorated (to 78-83% of minimum requirements), but the country saw a big improvement in the 1970s, partly due to initiatives of '*siasa ni kilimo' in 1972* and '*kilimo cha kufa na kupona*' in 1974 where food crops were given more incentives by the Tanzanian government than cash crops.

Average yields in the 1960s for both cereals and roots and tubers decreased (for cereals to a very low 600 kg/ha), although the area under crop cultivation expanded somewhat. In the heady years of the *Ujamaa* Revolution in the 1970s, the cropping area for cereals and pulses increased significantly, as did yield levels (see Table 1). In 1980 Tanzania could easily feed its rapidly expanding population on the basis of its own basic food production at a level that was 25-33% above minimum WHO requirements. Cereals had become more important than roots and tubers in the composition of the potential basic food basket. In 1961, 35% of all basic food energy came from cassava and some other roots and tubers, and 54% from cereals (mostly maize but also sorghum, millet and some rice). In 1980 food energy mainly came from cereals (63%) and the relative importance of cassava (and some other roots and tubers) had dropped to 27%. Maize, as a cereal, had become slightly less important (58% of all cereal calories) and rice production had increased so much that it already accounted for 10% of all cereal calories. In the 1980s, the area and yield levels for roots and tubers (mainly cassava and sweet potatoes) further increased and yield levels for cereals reached an all-time high (1500 kg/ha), although the area under cultivation decreased somewhat. As a result, the Tanzanian population, despite its on-going very high population growth, could potentially easily be fed with food grown in Tanzania itself.

However, the 1990s saw a dramatic decrease in the country's registered basic food production situation to levels that were below the low 1961 levels and 7-13% below minimum WHO requirements. What happened? Cereal areas and yields dropped a bit but this could not have been the sole cause of the fall in total food production. Problems were experienced in the yield levels of cassava, which fell to half those of a decade earlier, and they would never fully recover. Probably the statistical services in Tanzania no longer adequately covered the subsistence sector, which ever more included urban and peri-urban farming for home consumption purposes

The last ten years showed a remarkable recovery. Farmers more than doubled the area under cereals, while also the area under pulses and roots and tubers has increased. In a decade, the total area growing basic food crops increased from 5 million ha to 9.2 million ha. The last decade has seen some recovery in the yield levels of roots and tubers.

As a result of an expansion of farmers' activities, the food production situation improved to close to 100% of WHO requirements in 2011. The food basket in 2011 had further shifted away from roots and tubers and was 67% cereals, 12% pulses, 2% plantains and 19% roots

Table 1: Population and food production dynamics in Tanzania, 1961-2011

	1961	1970	1980	1990	2000	2011	2011/1961 index
Population (millions)	10.4	13.6	18.7	25.5	34.0	46.2	446
Cropping area (x m. ha of harvested crops)							
Cereals	1.3	1.7	2.9	2.6	2.5	5.7	452
Pulses	0.3	0.4	0.7	0.9	1.2	1.6	552
Roots/tubers[1]	0.6	0.8	0.7	1.0	1.3	1.6	271
Plantains	0.1	0.2	0.2	0.3	0.2	0.3	211
Total	2.3	3.2	4.5	4.7	5.2	9.2	403
Yield (1000 kg/ha)							
Cereals	0.8	0.6	1.0	1.5	1.4	1.4	171
Pulses	0.4	0.4	0.5	0.6	0.7	0.9	216
Roots/tubers	5.0	4.9	8.1	8.9	4.8	6.0	119
Plantains	2.6	2.6	2.6	2.6	2.3	2.6	100
Total basic food production (million tons)							
Cereals	1.0	1.0	3.0	4.0	3.6	7.9	773
Pulses	0.1	0.2	0.3	0.5	0.9	1.4	1190
Roots/tubers	3.0	3.7	5.6	8.6	6.2	9.8	322
Plantains	0.3	0.5	0.6	0.7	0.6	0.7	211
Food energy value of crop mix (kcal/kg) [recalculated from FAOSTAT][2]							
Cereals	3256	3241	3266	3282	3310	3235	99
Pulses	3326	3361	3397	3376	3349	3354	101
Roots/tubers	710	705	732	715	697	743	105
Plantains	886	884	885	888	875	896	101
Total [inferred]	*1364*	*1276*	*1624*	*1564*	*1754*	*1923*	*141*
Food energy value (x 1000 kcal/capita/year)							
Cereals	319	239	517	510	353	550	172
Pulses	38	45	61	70	84	101	269
Roots/tubers	208	193	220	242	126	157	76
Plantains	29	35	28	23	14	14	48
Total	*593*	*512*	*826*	*845*	*577*	*822*	*139*
Food energy value (x kcal/capita/day)							
Cereals	872	654	1417	1397	966	1505	172
Pulses	103	122	166	192	230	277	269
Roots/tubers	569	530	602	663	346	431	76
Plantains	81	97	77	63	40	39	48
Total	*1625*	*1403*	*2262*	*2314*	*1580*	*2251*	*139*

Source: Population data as used by FAOSTAT are from the *World Population Prospects: The 2010 Revision from the UN Population Division; all production data: FAOSTAT crop production* (final 2011 data, updated: 08 August 2013, accessed on 17 September 2013 from http://faostat.fao.org/site/567/default.aspx#ancor); food energy values recalculated from FAOSTAT Food Balance Sheets.

Notes:

1 Roots and tubers are mainly cassava and sweet potatoes in Tanzania.

2 These values have been recalculated by the authors from the food supply statistics in the Food Balance Sheets, which FAOSTAT gives in kg/capita/year and in kcal/capita/day. The resulting imputed values are lower than the values for the raw (unprocessed) foods found in regular food composition table (making due allowance for inedible peels). It is not clear from the FAOSTAT website, what corrections were factored in and how the amounts produced have to be interpreted: do the amounts produced include the amounts consumed in immature or fresh state (e.g. maize eaten fresh from the cob, fresh beans), or are all quantities expressed in mature equivalents (dry equivalents in the case of cereals and legumes). Furthermore, this raises questions about what losses are considered among the category "Waste" in the Food Balance Sheets, and how FAOSTAT can treat "Processing" as a "disappearance", when part of it "appears" again as available for

human consumption in modified form (e.g. in the form of flour or bread made from cereal grain). In the early days of the Food Balance Sheets work (1964-66), FAO published them in book form in tables where all these transformations were recorded explicitly.

and tubers. This might be a result of the Agricultural Sector Development Programme, which the Tanzanian government adopted, together with some major donors.

Many changes can be detected if we compare 2011 with 1961 (see Figure 4 and Table 2). With its population rising from 10.4 million in 1961 to 46 million in 2011 (i.e. by a factor 4.5), the cropping area for cereals grew at the same speed, with pulses far more so (by a factor 5.5), and roots and tubers by a factor 2.7, i.e. at only 60% of the level of total population growth. A production increase can be partitioned into two components as follows: the contribution of area is taken as the *increase* in area since 1961 multiplied by the yield in 1961 and the contribution of yield as the area in 1961 multiplied by the *increase* in yield since 1961. The percentage contribution is then obtained by expressing each component as a percentage of their sum. Thus, for the basic food crops taken together, 96% of the total growth of production can be attributed to area expansion in the past 50 years and only 4% to yield improvements. Tanzania's total area of basic food crops expanded from 2.3 million ha to 9.2 million ha between 1961 and 2011, an increase by a factor of 4 which is almost as high as the population increase in this same fifty-year period. Figure 4 compares population growth with staple food production growth. Table 2 gives more detailed food crop statistics, comparing 2011 with 1961.

Figure 4: Population and agricultural trends Tanzania 1961-2010
(Index year 1961=100)

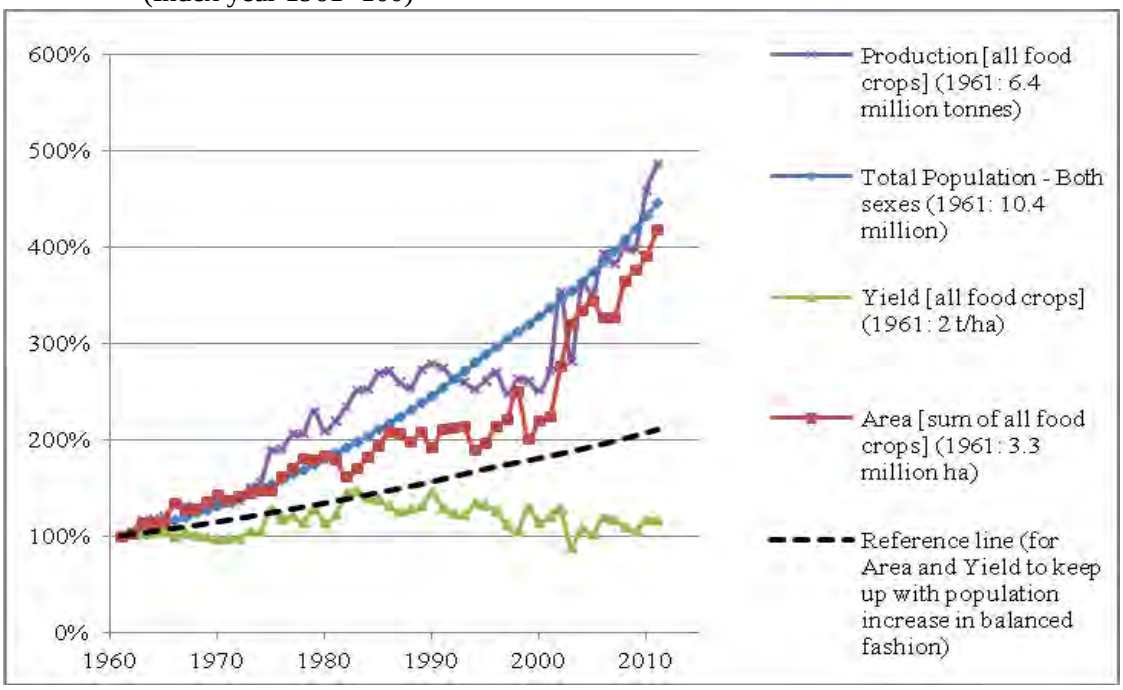


Table 2: Tanzania: more detailed food crop statistics for staple crops with at least 150,000 t production in 2011: comparison 1961 and 2011*

Crop	Harvested area (x 1000 ha)			Yield (x kg/ha)			Production (x m kg)		
	1961	2011	2011/ 1961 index	1961	2011	2011/ 1961 index	1961	2011	2011/ 1961 index
Cassava	570	740	130	4912	6281	128	2800	4647	166
Maize	790	3288	416	747	1320	177	590	4341	**736**
Sweet potatoes	31	699	2255	6936	5112	74	215	3573	**1662**
Rice, paddy	82	1119	1365	1146	2009	175	94	2248	**2392**
Potatoes	5	203	4062	3000	7659	255	15	1556	**10370**
Sorghum	200	811	406	900	994	110	180	807	**448**
Plantains	133	280	211	2600	2601	100	345	729	211
Beans, dry	193	738	382	415	916	221	80	676	**845**
Millet	180	328	182	806	951	118	145	312	215
Pigeon peas	16	288	1801	625	946	151	10	273	**2726**
Cow peas, dry	53	218	411	302	792	262	16	173	**1080**

* In **bold** food crops with production growth faster than population growth for the fifty-year period as a whole.
Source: FAOSTAT crop production(final 2011 data, updated: 08 August 2013, accessed on 17 September 2013 from http://faostat.fao.org/site/567/default.aspx#ancor

Tanzania's basic food area increased from 61% of the country's total agricultural area to 65% (see Table 3). There were a lot of dynamics with regard to the other agricultural crops. The harvesting area of a few relatively small crops expanded most, namely tobacco and cocoa. Fruits (most of it bananas and plantains) as well as tree nuts (mainly cashew) showed marked developments and oil crops (sunflower, groundnuts, coconut, sesame seed) also expanded significantly. With the exception of fibre crops (like sisal and cotton) the highest crop acreages were mostly reached in the most recent years. Yield levels for sugarcane and tobacco in 2011 were significantly higher than those in 1961 and most other non-basic food crops also showed improved yield levels in these 50 years, resulting in the highest-ever production figures in recent years for almost all crops. Finally, it is good to note that Tanzania still has a lot of non-agricultural space and has ample room for expansion but this would of course be at the expense of other land use. In 1961, only 4% of Tanzania's land area of 886,039 km² was in use although there was a lot of shifting cultivation still going on, so the actual land being used for crop production was higher. By 2011, total crop cultivation had increased to 16% of the country's total land area. Figures 5a and 5b show an assessment of where the major agricultural production areas are in Tanzania and which areas produce food surpluses (around 2005).

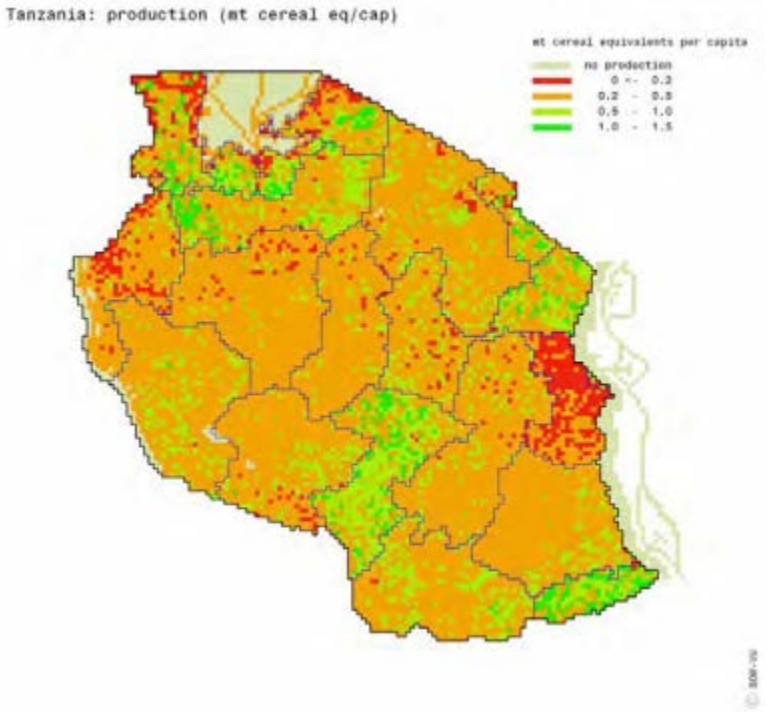
Tanzania has also experienced an increase in livestock figures, especially during the last two decades (see Table 4a). Except for pigs and chickens, however, the 1961-2011 growth figures of the several livestock species were (sometimes considerably) lower than the growth of the Tanzanian population.

Table 3: Tanzania's crops: harvested area (x 1000 ha), 1961-2011

Crop	1961	2011	2011/1961 index
Cereals	1260	5694	452
Pulses	295	1629	552
Roots/tubers	607	1644	271
Plantains	133	280	211
Pyrethrum	13	20	154
Fibres	450	283	63
Oil crops	569	2916	512
Fruits excl. Plantains	76	650	856
Vegetables	121	347	287
Tree nuts	87	413	474
Spices	31	12	41
Cocoa	1	11	1080
Coffee	85	117	137
Sugarcane	15	25	167
Tea	6	9	155
Tobacco	5	168	3200
Total	*3753*	*14217*	*379*
Basic food/Total*	*61%*	*65%*	

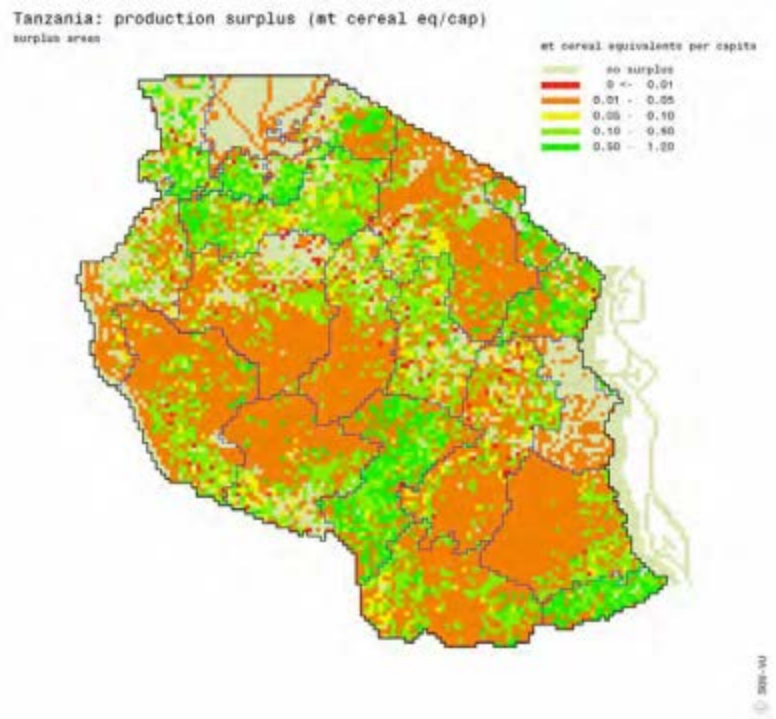
* This includes plantains for Tanzania. Without plantains it would be 58% in 1961 and 63% in 2011.
Source: FAOSTAT crop production(final 2011 data, updated: 08 August 2013, accessed on 17 September 2013 from http://faostat.fao.org/site/567/default.aspx#ancor).

Figure 5a: Major agricultural production areas in Tanzania, around 2005



Source: Van Wesenbeeck, C.F.A. & M.D. Merbis (2012), *Africa in Maps, data repository of the food economy in Sub-Saharan Africa*. Amsterdam: Centre for World Food Studies.

Figure 5b: Food surplus areas in Tanzania, around 2005



Source: Van Wesenbeeck, C.F.A. & M.D. Merbis (2012), *Africa in Maps, data repository of the food economy in Sub-Saharan Africa*. Amsterdam: Centre for World Food Studies.
Note: According to Blandina Kilama, it is strange to see Mtwara, and to a lesser extent Lindi (in the South East), as among the food surplus areas. These areas have the highest child mortality rates in the country and high poverty rates too (PHDR 2005 and DHS).

Table 4a: Tanzania's livestock (x millions), 1961-2011

Year	1961	1970	1980	1990	2000	2011	2011/1961 index
Cattle	8.1	10.1	12.6	13.0	16.7	21.3	264
Sheep	3.0	2.8	3.8	3.6	3.5	6.4	214
Goats	4.5	4.4	5.7	8.5	11.9	15.2	341
Pigs	0.1	0.1	0.2	0.3	0.5	0.5	538
Total	*15.6*	*17.5*	*22.2*	*25.4*	*32.6*	*43.4*	*278*
Chickens	7.0	10.8	17.0	20.5	27.8	34.0	486
Total TLU	*6.5*	*8.0*	*9.9*	*10.6*	*13.6*	*17.5*	*270*
TLU/capita	*0.62*	*0.59*	*0.53*	*0.42*	*0.40*	*0.38*	*60*

Source: *FAOSTAT Live Animals* (final 2011 data, updated: 08 August 2013, accessed on 19 September 2013 from http://faostat.fao.org/site/636/DesktopDefault.aspx?PageID=636#ancor); TLU calculations: cattle x 0.7; goats, sheep and pigs x 0.1; and chickens x 0.01.

The amounts of fish and fishery products in Tanzania grew faster than the country's population, both from fresh water and from the sea, but the booming growth of the 1970-1980s have not been sustained, so that the current availability per capita is only 8% above the 1961 level (see Table 4b).

Table 4b: Tanzania's fisheries (x 1000 tonnes), 1961-2011

Year	1961	1970	1980	1990	2000	2011	2011/1961 index
Crustaceans						0.3	
Fresh water fishes	55.0	166.4	189.9	357.3	271.2	291.2	529
Miscellaneous				2.0	1.3	1.8	
Sub-total Inland waters	*55.0*	*166.4*	*189.9*	*359.3*	*272.5*	*293.3*	*533*
Aquatic plants	1.5	4.0	3.0	4.3	6.0	7.3	483
Crustaceans	0.5	0.5	0.2	2.0	2.1	1.9	376
Marine fishes	15.2	19.5	37.7	54.1	47.9	47.9	315
Miscellaneous	0.9	0.8	0.4	0.7	1.2	2.2	245
Sub-total Marine areas	*18.1*	*24.8*	*41.3*	*61.1*	*57.3*	*59.2*	*327*
Total Tanzania	*73.1*	*191.2*	*231.2*	*420.4*	*329.8*	*352.5*	*482*
kg/capita	7.0	14.1	12.4	16.5	9.7	7.6	108

Source: FAO-Fisheries and Aquaculture Information and Statistics Service, accessed on 29 October 2013 from http://www.fao.org/fishery/topic/16140/en

If we compare Tanzania's agricultural dynamics for all major crops and livestock species for each of the five decades between 1961 and 2011 it is very clear that the last ten years show remarkable progress. Four crops are particularly interesting to study: sweet potatoes, ground-nuts, sesame seed and sunflower. See Table 5. The production of sweet potatoes increased in the 1960s and 1970s (during that decade faster than population growth for the decade), but deteriorated a lot in the 1980s and 1990s. The last decade shows a very remarkable recovery (see Figure 12a below). The production of groundnuts contracted in the 1960s, grew fast in the 1970s, slowed down in the 1980s and contracted again in the 1990s Also here the 2000s shows a very remarkable recovery (see Figure 12b below). The production of sesame seed decreased in the 1970s, picked up since the 1980s and started to boom about 10 year ago (see Figure 12d below). Finally sunflower production shows a steady growth, with the exception of the 1980s and early 1990s (see Figure 12g below). In section 3 we will see if these (or other) crops deserve some further analysis.

Table 5: Tanzania's Agricultural Dynamics according to FAOSTAT in five periods: trends ratios for human population and stock size and for quantities of crops and animal products produced, respectively.

Colours indicate the degree of 'success':

- The decade with the highest relative growth: green if higher than population growth ; blue if lower than population growth.
- Other decades: yellow: figures higher than population growth; no colour: positive growth, but lower than population growth; red: decline.

Trend ratios higher than that for population in the same period are indicated in **bold**. Most successful crops and livestock species in the last decade are also indicated in **bold**.

Crops/ Livestock	1961-1970	1970-1980	1980-1990	1990-2000	2000-2011	Acreage in 2009-2011
Population[1]	*1.31*	*1.38*	*1.36*	*1.33*	*1.32**	
Crops[2] **production** (ranked by decreasing acreage in 2009-2011)						m ha
Maize	0.83	***3.54***	***1.42***	0.80	***2.21***	3.100
Rice, paddy	***1.40***	***2.20***	***2.54***	1.06	***2.88***	1.020
Beans, dry	***1.63***	***1.92***	***1.36***	***1.59***	1.25	0.938
Cassava	1.22	***1.41***	***1.61***	0.69	0.87	0.898
Sorghum	0.96	***2.97***	0.91	1.29	***1.35***	0.768
Coconut	***1.39***	0.96	***1.47***	0.81	***1.49***	0.671
Sweet potatoes	1.14	***2.25***	0.73	0.52	***17.20***	0.642
Groundnuts	0.85	***1.60***	1.11	0.87	***12.53***	0.529
Sunflower seed	1.22	***2.70***	0.75	***4.50***	***5.83***	0.525
Bananas	***1.58***	1.08	1.11	***4.26***	***4.49***	0.486
Seed cotton	***2.27***	0.77	0.85	0.83	***1.33***	0.389
Millets	1.1	2.2	0.6	1.1	1.1	0.357
Sesame seed	0.93	1.33	***1.93***	***1.34***	***9.16***	0.289
Fresh vegetables[3]	1.24	1.18	1.11	0.94	***1.85***	0.282
Plantains	***1.58***	1.08	1.11	0.85	1.30	0.274
Cashew	***2.15***	0.39	0.41	***7.10***	1.00	0.245
Cow peas	0.76	***3.23***	***1.90***	***1.47***	***1.58***	0.202
Pigeon peas	***1.68***	1.36	***2.33***	***1.57***	***3.24***	0.196
Coffee	***1.40***	1.04	1.12	0.89	1.27	0.195
Potatoes	**3.69**	***4.16***	***1.80***	***1.45***	***2.59***	0.191
Peas	***2.07***	1.21	***2.93***	***1.43***	***2.99***	0.165
Pulses, other	0.94	***1.49***	***2.57***	***3.33***	***1.83***	0.114
Wheat	***9.34***	***1.58***	1.18	0.31	***3.45***	0.104
Tobacco	***4.43***	***1.40***	0.98	***1.60***	***4.93***	0.101
Sisal	1.01	0.43	0.29	0.61	1.21	0.057
Chick peas	***3.16***	0.72	***2.93***	1.26	***2.56***	0.048
Livestock						
Stock of animals kept[4] *(ranked by decreasing stock in terms of TLU)*						m TLU
Cattle	1.26	1.24	1.04	1.28	1.27	13.917
Goats	0.99	1.28	***1.51***	***1.39***	1.28	1.413
Sheep	0.95	1.34	0.94	0.98	***1.83***	0.453
Chickens	***1.54***	***1.57***	1.21	***1.36***	1.22	0.335
Pigs	1.27	1.35	***2.01***	***1.41***	1.11	0.050
Animal products						m tonnes
Milk from cattle	**1.49**	1.04	**1.42**	**1.38**	***2.45***	1.664
Milk from goats	1.00	1.16	***1.48***	1.17	1.13	0.107
Meat from cattle	**1.39**	1.12	***1.58***	1.18	1.14	0.266
Meat from chicken	***1.91***	**1.64**	**1.55**	**1.74**	**1.33**	0.055
Meat from game	**1.40**	1.21	**1.44**	1.09	***1.53***	0.020
Meat from pigs	1.27	1.33	***2.03***	**1.41**	1.12	0.014
Meat from sheep	1.10	1.31	0.96	1.04	1.21	0.012
Meat from goats	0.99	1.25	***1.40***	**1.37**	1.18	0.033
Honey	**1.44**	1.27	***1.89***	**1.44**	1.31	0.034

Eggs from chicken	**1.52**	***1.90***	1.10	1.13	0.96	0.032

Notes with Table 5:

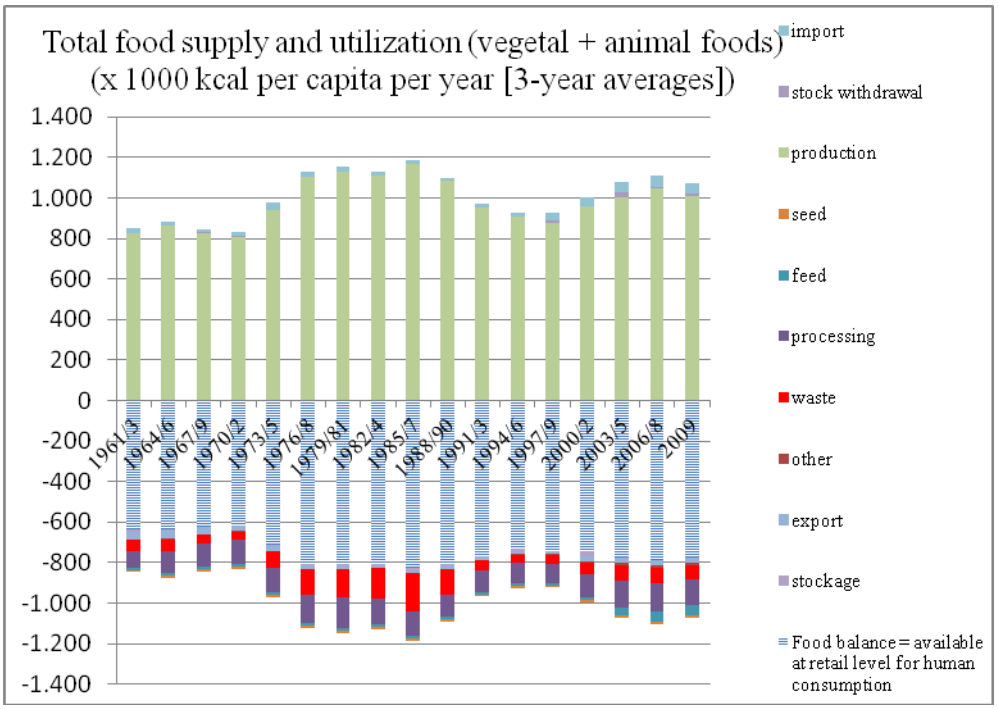
1 The trend ratio is the size of the population at the end of the decade divided by the size of the population at the beginning of the decade. The % growth during the decade is 100*(trend ratio – 1).
2 Included are crops with more than 45,000 ha cultivated in 2009-2011.
3 Fresh vegetables other than tomatoes, onions, cabbages, chillies, peppers, garlic, green maize, green legumes and watermelons.
4 Included are animals with stocks of more than 45,000 tropical livestock units (TLU) in 2009-2011.

Source: FAOSTAT | © FAO Statistics Division 2013 (updated: 08 August 2013, Accessed on 17 September 2013 from http://faostat.fao.org/site/567/).

2 Tanzania's food balance 1961-2011

Food production and food consumption are connected, but not the same. FAO's food balance data show that food production, imports and stock withdrawal are one side of food availability, but seeds, feed, processing, waste, export and stocks all deduce food available for direct consumption at retail level. Feed and processing can mean indirect food availability, but this can also be (partly) exported. The food production data per capita show the same picture as in Section 1 (there we looked at all basic foods, here at all vegetal and animal foods). The 1960s and 1990s show a deteriorating food production situation (with food production lower than minimum food requirements), the 1970s/80s and again the 2000s a much better situation (with food production higher than minimum food requirements). Food imports have always been low in Tanzania, although slightly increasing during the 2000s. In the 1960s and again in the 1990s this must have resulted in considerable under-nutrition. Food availability at retail level shows the same ups and downs as basic food production levels: relatively low and deteriorating during the 1960s, improving during the 1970s and 1980s, dramatically deteriorating during the 1990s and showing fast recovery during the most recent decade (see Figure 6a). Figure 6b shows the increasing relative importance of cereals in the basic food consumption package, but also that available basic food at retail level did not yet recover from the deterioration during the 1990s. In Figure 7 the composition of the food basket shows that non-basic food (everything besides cereals, pulses and roots and tubers) gradually became more important, and particularly during the 2000s. These figures can be seen with more details in Figure 8. The data on staple crops (Figure 6) show that staple crop availability at retail (and farm) level has never been enough to feed Tanzania's population at levels sufficient according to WHO norms. Adding all other types of food (as in Figures 7 and 8) shows that total food availability was never really sufficient. Figure 9 shows a map with a geographical assessment of the total per capita food consumption around 2005. The data used for that map suggest that all Tanzanian regions are food insecure at consumption level. The areas with the lowest consumption per capita are in the densely populated North-western parts of the country, in the centre, all along the coast (except Dar es Salaam) and in the south near the boundary with Mozambique (consistent with the remark made as an addition to Figure 6).

Figure 6a: Food balance data for Tanzania, 1961-2009



LEGEND:

- Positive scale - sources of food supply: production + withdrawal from stocks + import;
- Negative scale – 7 'disappearances' into utilizations other than human consumption: putting into stocks + export + other + waste + processing + feed + seed;
- Amount remaining (shaded part: the 'food balance') = *indirect* estimate of food available at retail level for human consumption.

Note 1: Disappearance data are positive amounts, but in this graph they are represented on the negative scale, adding up to the same total as the food supply.

Note 2: The legend shows the utilizations in reverse order which is due to a technical constraint in constructing this 'mirror image' graph.

Figure 6b: Staple food composition at retail level, Tanzania 1961-2009

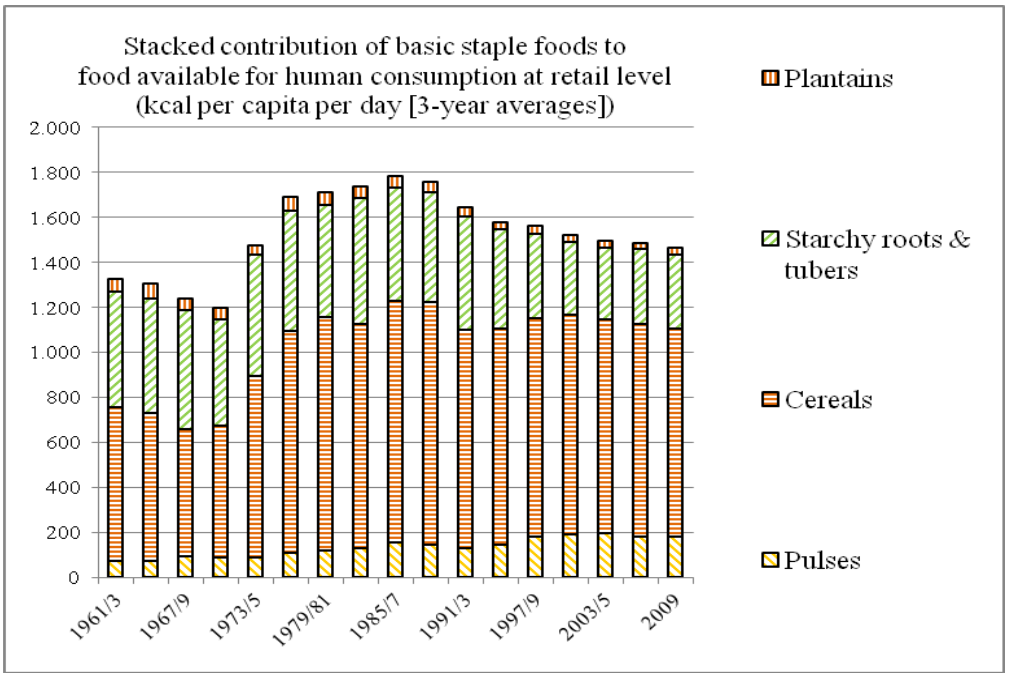
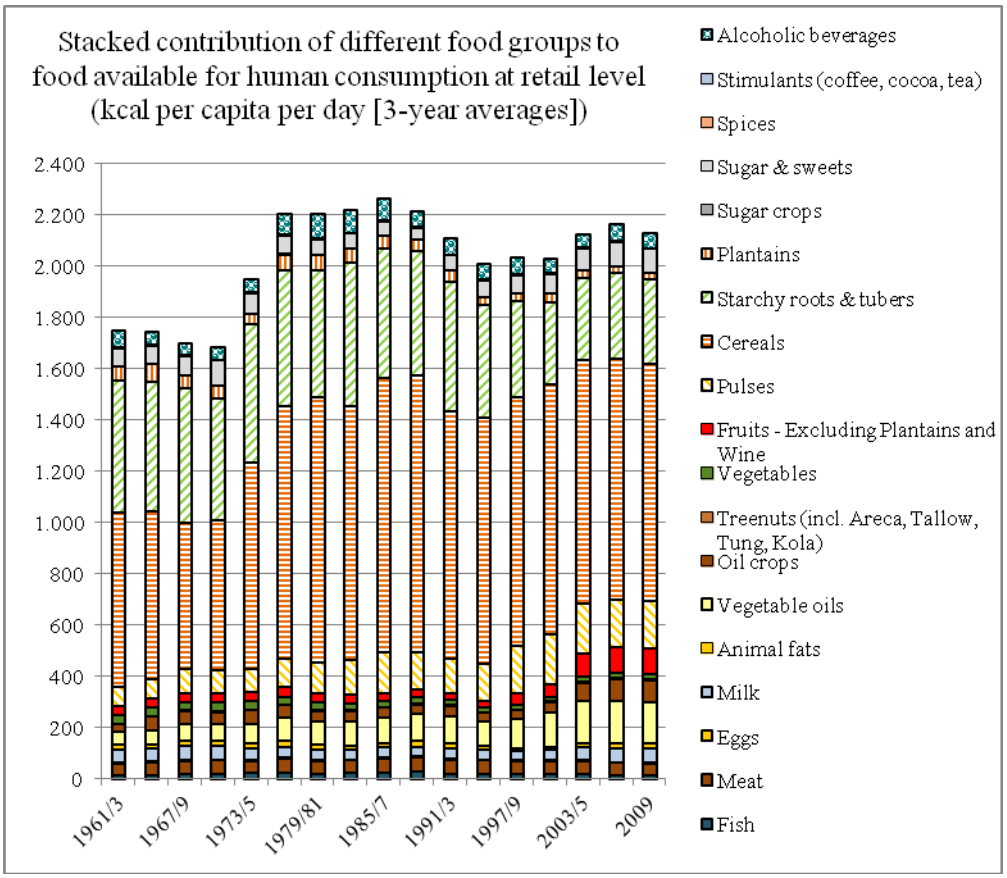


Figure 7: The composition of the total food basket in Tanzania



Note: Stimulants, spices, sugar crops, oil crops and eggs are hardly visible due to their small contribution. Figures 6 and 8 give a more detailed breakdown of the same graph.

Figure 8: Composition of nutritious non-staple foods at retail level, Tanzania 1961-2009

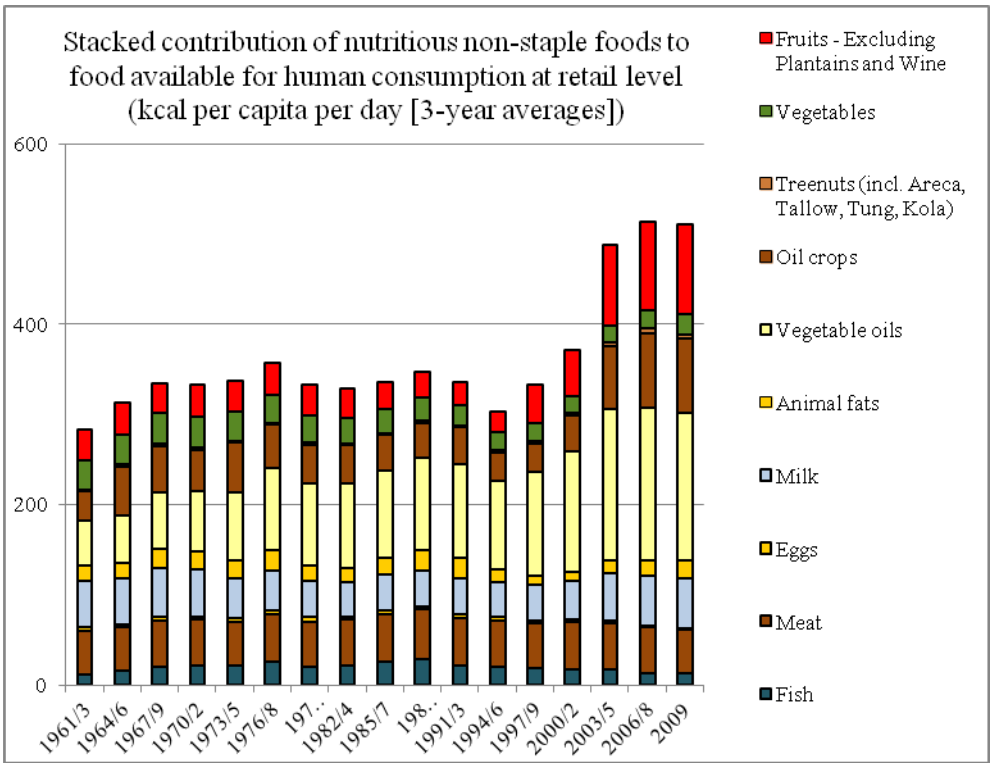
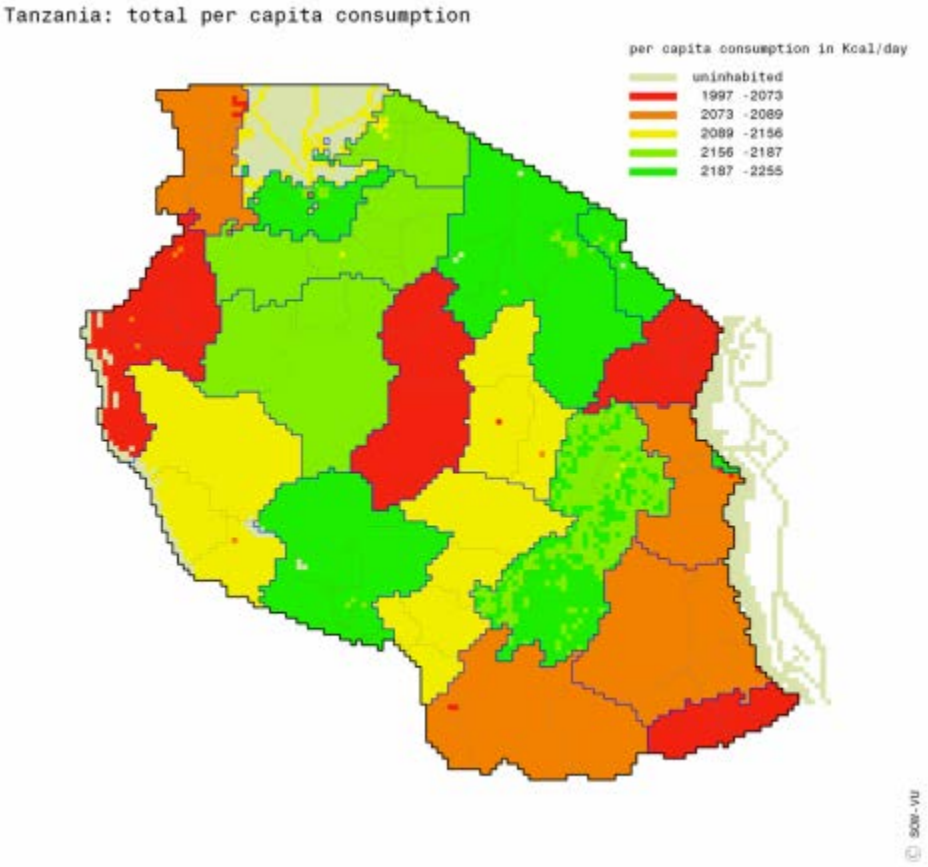


Figure 9: Geographical differences in food consumption per capita in Tanzania around 2005



Source: *Van* Wesenbeeck, C.F.A. & M.D. Merbis (2012), *Africa in Maps, data repository of the food economy in Sub-Saharan Africa*. Amsterdam: Centre for World Food Studies.

3 Tanzania's most successful agricultural products, 2000-2010

In Section 1 we concluded that there were many crops in Tanzania with remarkable production increases during the most recent decade. Three crops showed the highest growth figures between 2000 and 2010: sweet potatoes, groundnuts and sunflowers. In Table 6a all major crops are compared (with more than 50,000 ha in 2011; in decreasing order) on two indexes: production increases and yield increases. If the production increase was higher than population growth (134% for the decade) AND yield increases were more than 20% (and preferably higher than population growth) we regard these crops as very successful crops, worthy of further analysis. There are seven of these highly successful crops: sweet potatoes, groundnuts, bananas, coconut, cowpeas, pigeon peas and sesame seeds. Sunflower (mentioned in Section 1 as a high growth crop) and also 'other pulses' and tobacco had a considerable yield increase as well, but lower than population growth. Table 6b shows the same procedure for Tanzanian livestock. As already concluded in Section 1, none of the livestock species experienced a growth in numbers higher than population growth for the decade. Table 7 offers a summary of the findings from Tables 6a and 6b.

Table 6a: Performance of Tanzania's major crops between 2000 and 2010[1] (population growth 2000-2010[2]: 32%)

Crops> 45,000 ha in 2010 (highest acreage first) Green: Promising crop Red: Problem crop	Harvested area in 2010 (x 1000)	Production [index number of 2010 compared to 2000] Green >132 Turquoise:>120<132 Red <100	Yield [index number of 2010 compared to 2000] Green >132 Turquoise:>120 <132 Red < 100	Area [index number of 2010 compared to 2000] Green >132 Turquoise:>120 <132 Red < 100
Maize	3100	176	53	330
Rice paddy	1020	262	101	255
Beans	938	143	105	140
Cassava	898	100	79	127
Sorghum	768	125	116	110
Coconut	671	155	114	135
Sweet potatoes	642	430	263	161
Groundnuts	529	440	154	309
Sunflower	525	343	131	250
Bananas	486	422	246	172
Seed cotton	389	148	110	141
Millets	357	157	95	165
Sesame	289	634	164	368
Vegetables[3]	282	164	83	197
Plantains	274	107	95	109

Cashew	245	78	41	270
Cow peas	202	167	143	134
Pigeon peas	196	222	148	152
Coffee	195	107	77	158
Potatoes	191	216	87	250
Peas	165	251	105	239
Pulses, other	114	224	130	168
Wheat	104	126	76	172
Tobacco	101	281	123	242
Sisal	57	107	82	131
Chick peas	48	168	213	78

Notes:

1 2000 = average of 1999-2001; 2010 = average of 2009-2011.

2 For population size, estimates for the single years 2000 and 2010 were used.

3 Fresh vegetables other than tomatoes, onions, cabbages, chillies, peppers, garlic, green maize, green legumes and watermelons.

Source: FAOSTAT | © FAO Statistics Division 2013 - Updated: 08 August 2013, Accessed on 17 September 2013 (http://faostat.fao.org/site/567/)

Table 6b: Performance of Tanzania's major animals 2000-2010 (population growth 2000-2010: 32%)

Product/Type of animal Green: Promising species Red: Problem species	Number of animals producing or slaughtered in 2010 (x 1000)	Production* [index number of 2010 compared to 2000] Green >132 Turquoise: >120<132 Red <100	Weight of milk/meat/eggs per animal [index number of 2010 compared to 2000] Green >132 Turquoise: >120<132 Red < 100	Offtake (% of animals producing or slaughtered out of total stock) [index number of 2010 compared to 2000] Green >132 Turquoise: >120<132 Red <100	Head count [index number of 2010 compared to 2000] Green >132 Turquoise: >120<132 Red < 100
Cow's milk	6,867	226	170	117	114
Goat's milk	2,684	112	94	119	100
Hen's eggs	12,333	95	80	119	100
Duck's eggs	500	99	93	106	100
Chicken meat	60,033	131	110	119	100
Duck meat	1,320	106	99	106	100
Cattle meat	2,743	107	102	117	90
Goat meat	2,770	113	95	119	100
Sheep meat	1,009	117	90	129	100
Pig meat	350	111	101	110	100

* The index number of total production is the multiplication of the index for head count times the 2 indices for 'yield' (offtake and weight per animal)

Source: FAOSTAT | © FAO Statistics Division 2013 - Updated: 08 August 2013, Accessed on 19 September 2013 (http://faostat.fao.org/site/636)

As we are dealing with agro-food products, we will neglect tobacco. The other most successful crops and livestock species are highly relevant for food security though. For those we will give dynamic data for the period as a whole: Figure 12a for sweet potatoes, Figure 12b for groundnuts, Figure 12c for bananas, Figure 12d for sesame, Figure 12e for cowpeas, Figure 12f for pigeon peas, Figure 12g for sunflower and Figure 12h for pulses, n.e.s. (not elsewhere specified). For the livestock sector we regard cow's milk as the most successful item, mainly thanks to yield increase (Figure 12i).

Table 7: Tanzania: successful and less successful crops and livestock species, 2000-2010*

Crops and livestock: Yield increases 2000-2010		Production increases 2000-2010		
		<100%	100-138%	>138%
	>138% >120%			**Sweet potatoes** **Groundnuts** **Bananas** **Sesame** **Cowpeas** **Pigeon peas** **Cow's milk** **Sunflower** **Pulses, n.e.s.** [1] **Tobacco**
	100-120%		Sorghum Chick peas Chicken meat Cattle meat Pig meat	Rice Beans Coconut Cotton Peas Fish[2]
	< 100%	Cashew Hen's eggs Duck's eggs	Wheat Cassava Plantains Coffee Sisal Goat's milk Duck meat Goat meat Sheep meat	Maize Millet Vegetables Potatoes

* In **bold**: most successful crops and livestock species.

Notes:

1 n.e.s. = not elsewhere specified

2 For fish no information is available that can be taken as an index of 'yield'.

Figure 12a: Sweet potatoes as a recently successful crop in Tanzania: production dynamics 1961-2011

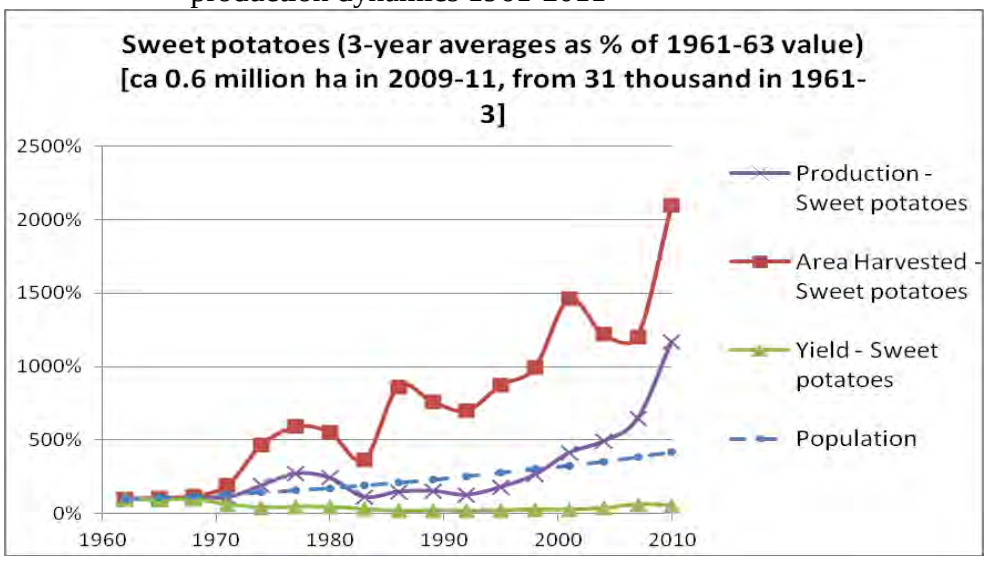


Figure 12b: Groundnuts as a recently successful crop in Tanzania: production dynamics 1961-2011

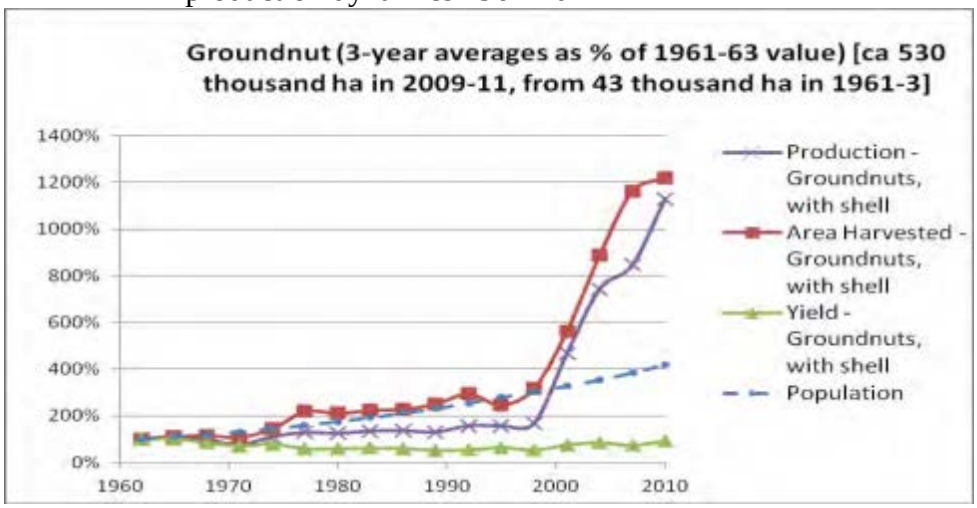


Figure 12c: Bananas as a recently successful crop in Tanzania: production dynamics 1961-2011

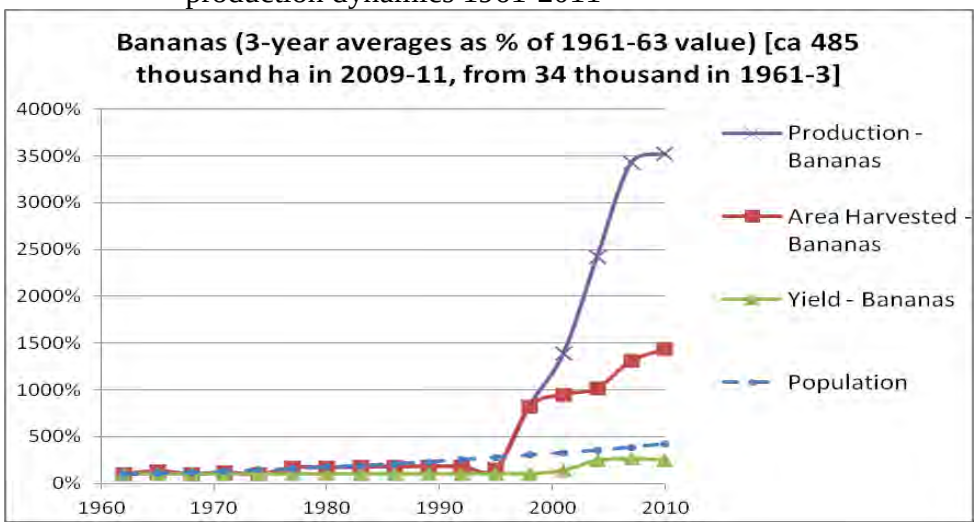


Figure 12d: Sesame as a recently successful crop in Tanzania: production dynamics 1961-2011

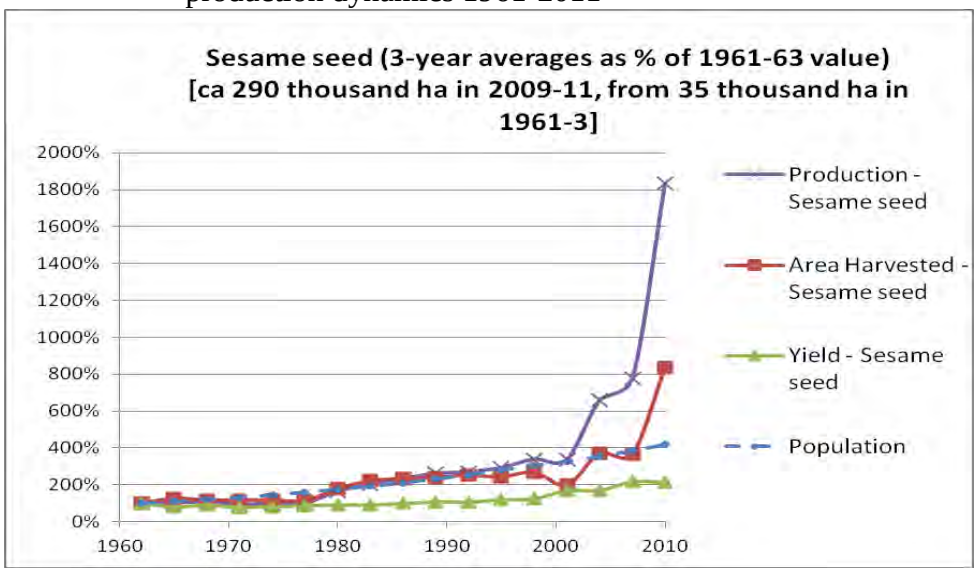


Figure 12e: Cowpeas as a recently successful crop in Tanzania: production dynamics 1961-2011

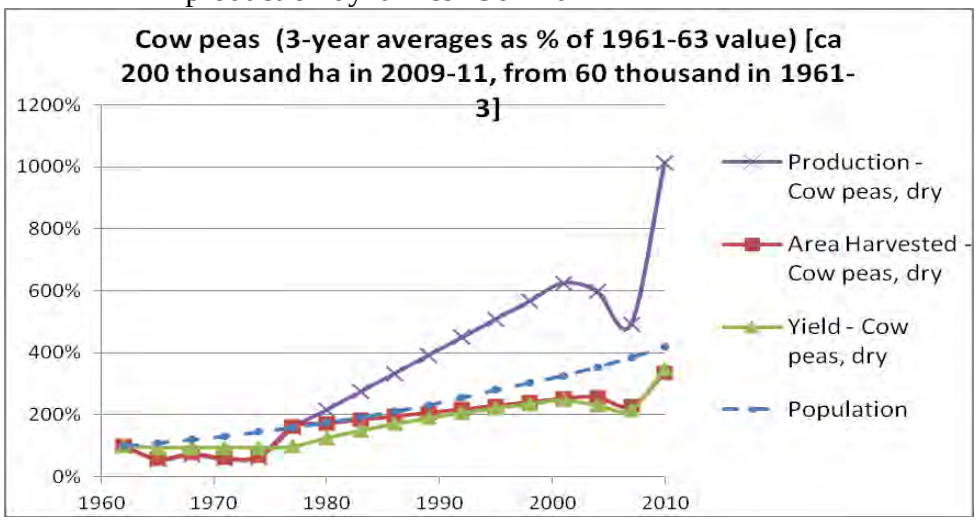


Figure 12f : Pigeon peas as a recently successful crop in Tanzania: production dynamics 1961-2011

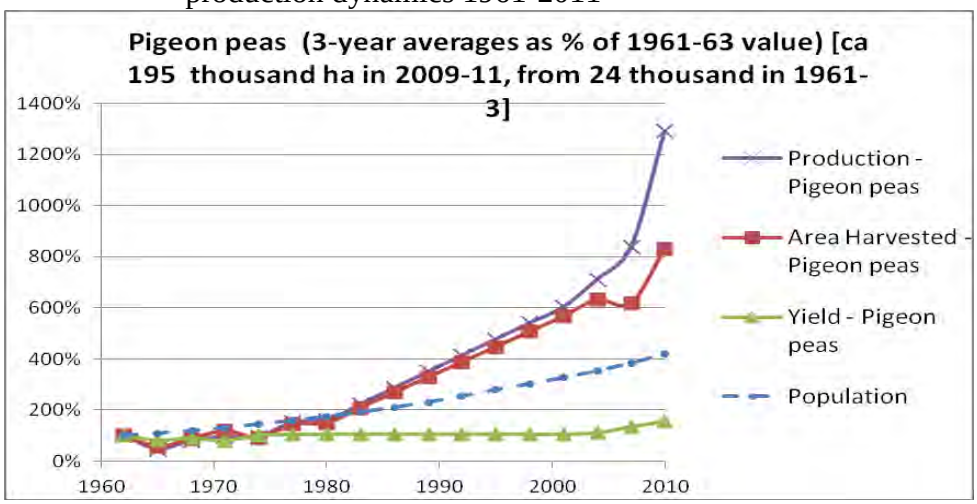


Figure 12g: Sunflower as a recently successful crop in Tanzania: production dynamics 1961-2011

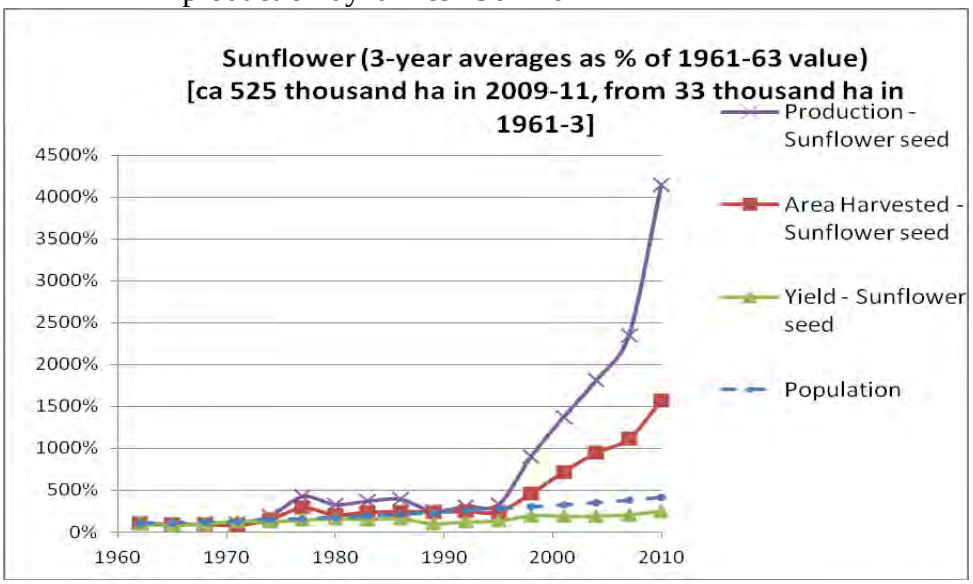
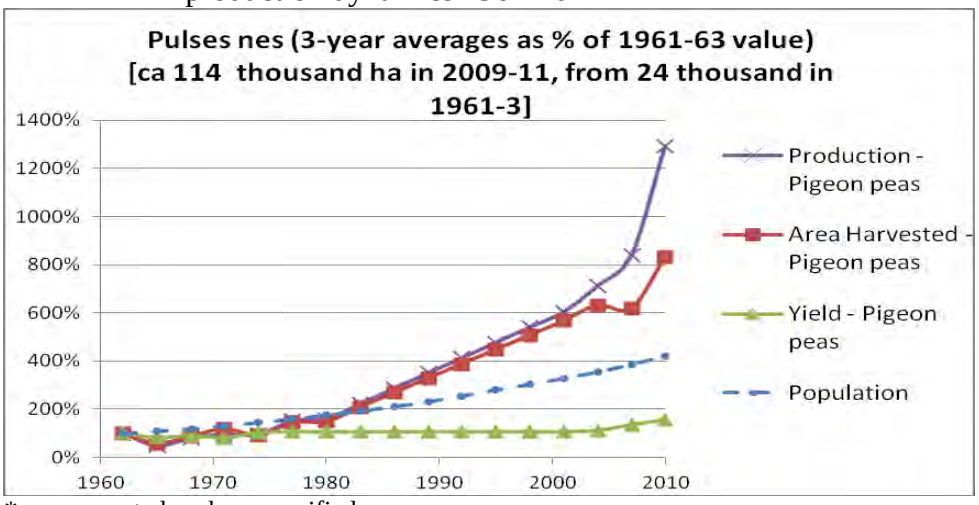
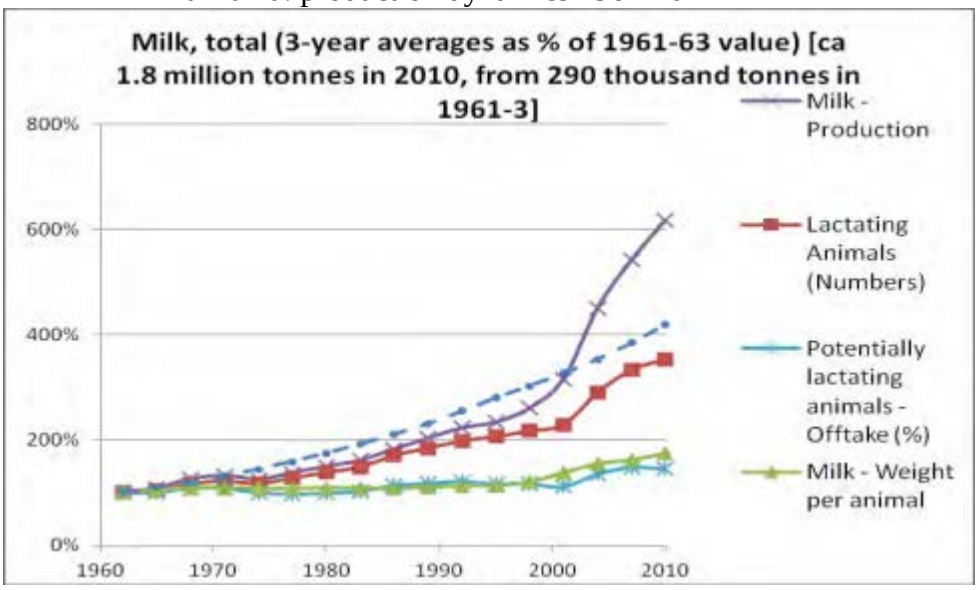


Figure 12h: Pulses, n.e.s.* as a recently successful crop in Tanzania: production dynamics 1961-2011



* n.e.s. = not elsewhere specified

Figure 12i: Cow's milk as a recently successful livestock product in Tanzania: production dynamics 1961-2011

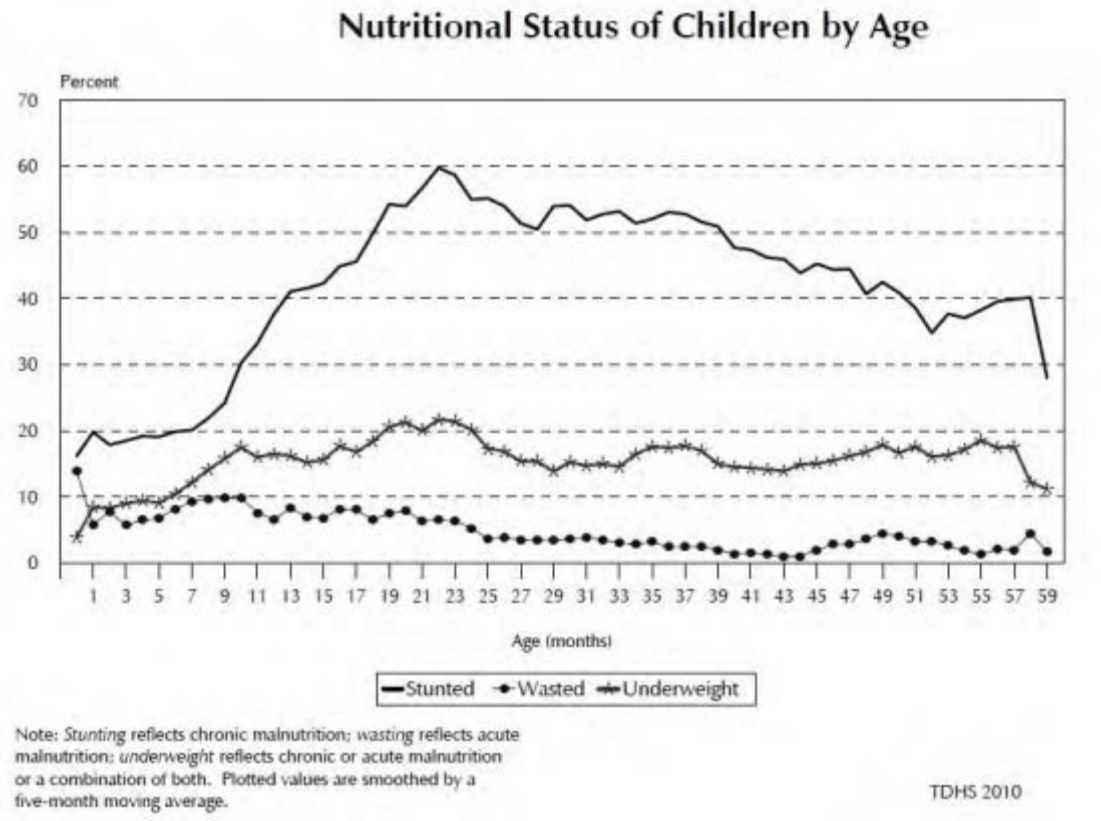


4 Tanzania's food security as indicated by DHS child under-nutrition data and by the FAO measure of hunger

In Tanzania there have been Demographic and Health Surveys approximately every 5 years since 1991-92. In 2006 new international WHO growth standards became available and applied to the two most recent surveys in 2004/05 and in 2010. The DHS give measures of different aspects of child under-nutrition and are indicative of the combined effects of actual and chronic food insecurity and of child health and care. Figure 13 shows how the acute form of under-nutrition (wasting = thinness) is highest in the second semester of the first year of life, when the baby is particularly vulnerable as new foods are introduced besides breast-

feeding. While the occurrence of wasting subsides with increasing age, the chronic form (stunting = linear growth retardation) increases strongly up to 2 years and remains alarming afterwards. The prevalence of underweight is the combination of wasting and stunting. Figure 14 shows that the indicator of chronic under-nutrition among under-fives (stunting) is alarming and that the prevalence of underweight is also reason for concern. The 2010 results show that acute under-nutrition in Tanzania is already high in the first two years of a child's life and that the negative effect on linear growth accumulates with age (Figure 15a). Under-five boys are more under-nourished than under-five girls (Figure 15b). Rural under-fives are considerably more undernourished than urban under-fives (Figure 15c), and there are very dramatic differences between regions, with the Zanzibari islands and the Northern and Central zones worst in terms of wasting (Figures 15d and 15e) and the Southern Highlands and again Central zones worst in terms of stunting (Figure 15e). As everywhere else there is more under-nutrition among the poor than among the rich (Figure 15f). The figures for the poorest quintiles are truly alarming, while only the relatively richest quintile is in the less than serious zone, but still far from normal, i.e. far from the 2.5% below -2SD on both indicators (which applies to the situation in the communities from which the WHO growth standards have been derived). The trend in nutritional status of under-fives in Tanzania shows an improvement since the 1990s, but is contradictory between 2004/5 and 2010: it seems to be improving somewhat in terms of chronic under-nutrition but deteriorating in terms of acute under-nutrition (Figure 15g), and the overall situation is still bad.

Figure 13: Tanzania: children's under-nutrition in 2010, by age



Source: Fig. 11.1 in National Bureau of Statistics (NBS) [Tanzania] and ICF Macro (2011), *Tanzania Demographic and Health Survey 2010*. Dar es Salaam: NBS and ICF Macro.

Figure 14: Tanzania: children's under-nutrition in 2010, three indicators of a very bad situation

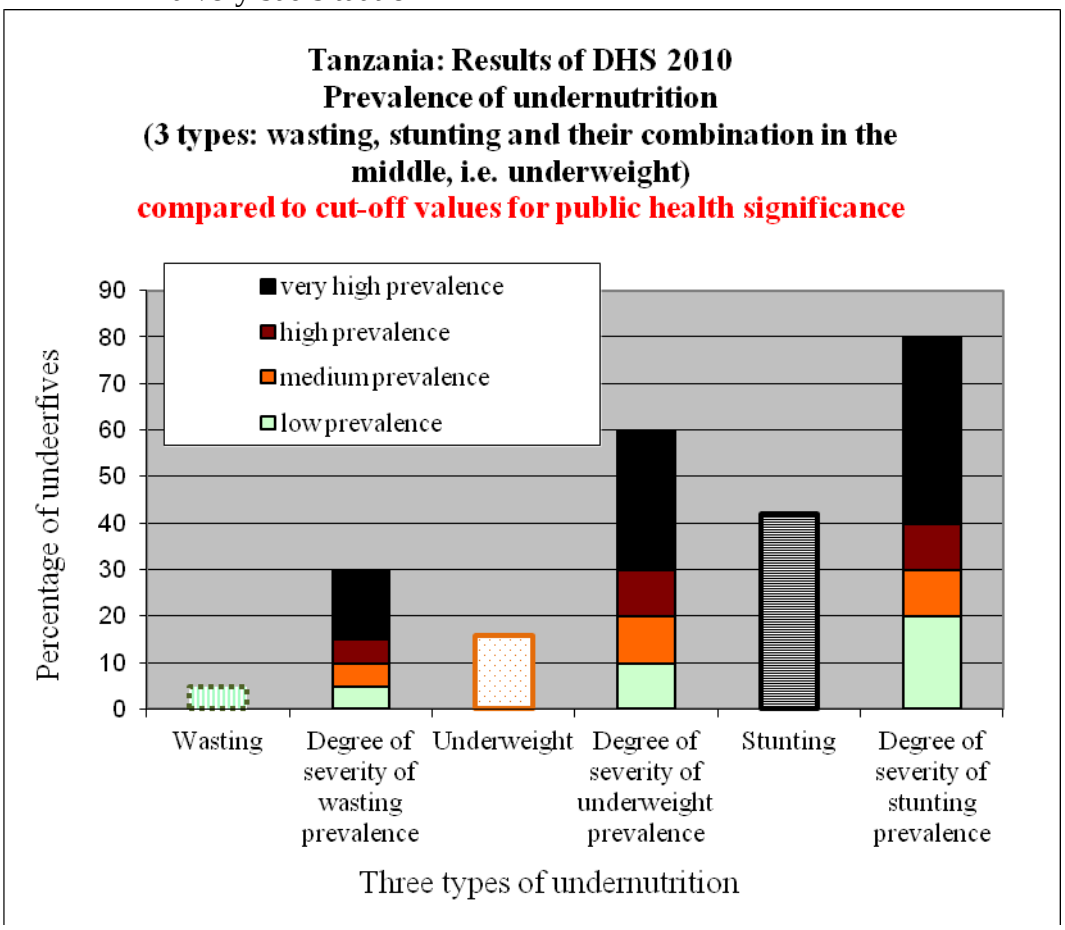


Figure 15a: Tanzania: under-five under-nutrition by age subgroup

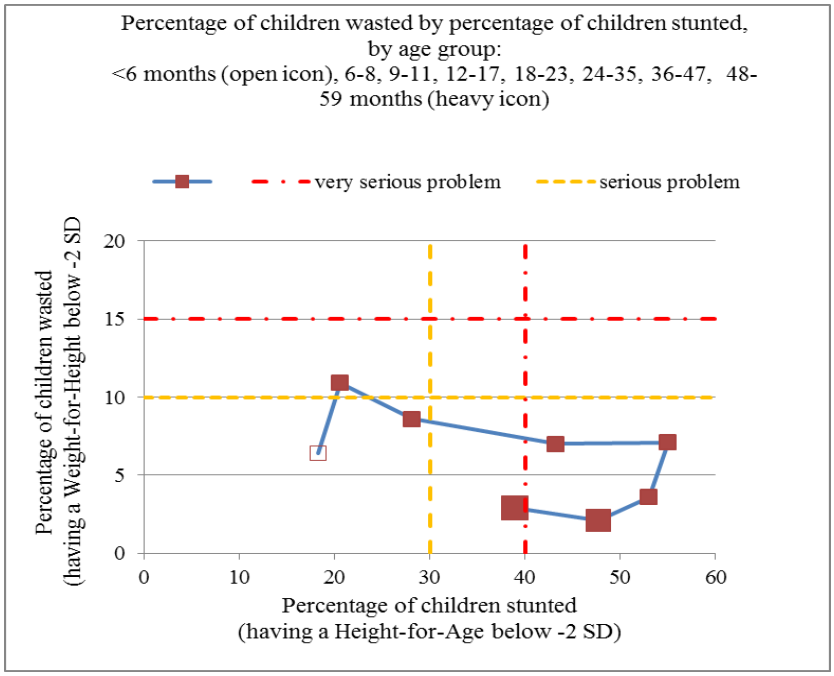


Figure 15b: Tanzania 2010: under-nutrition, differences between boys and girls

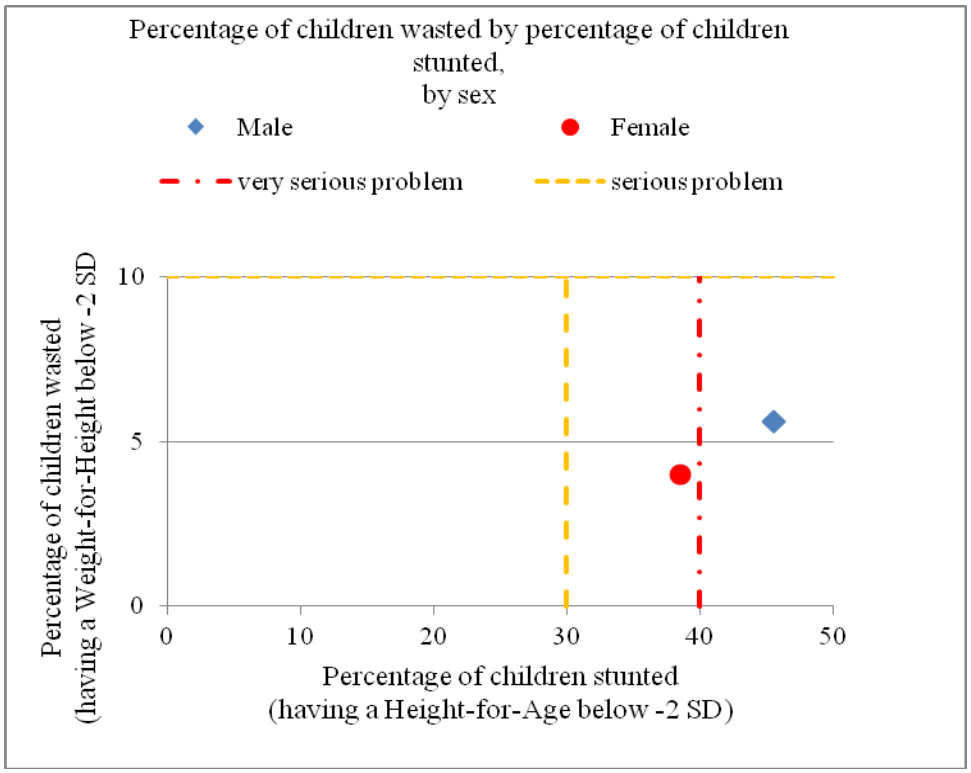


Figure 15c: Tanzania 2010: under-nutrition differences between rural and urban areas

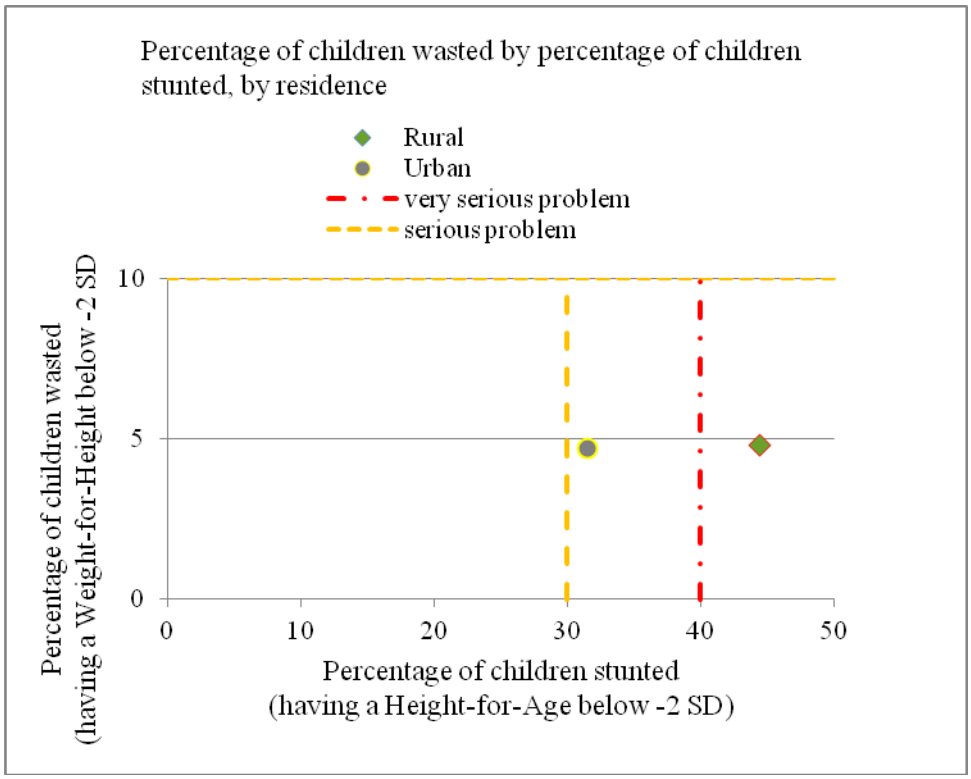


Figure 15d: Tanzania 2010: under-nutrition: comparison between Zanzibar and mainland (urban and rural)

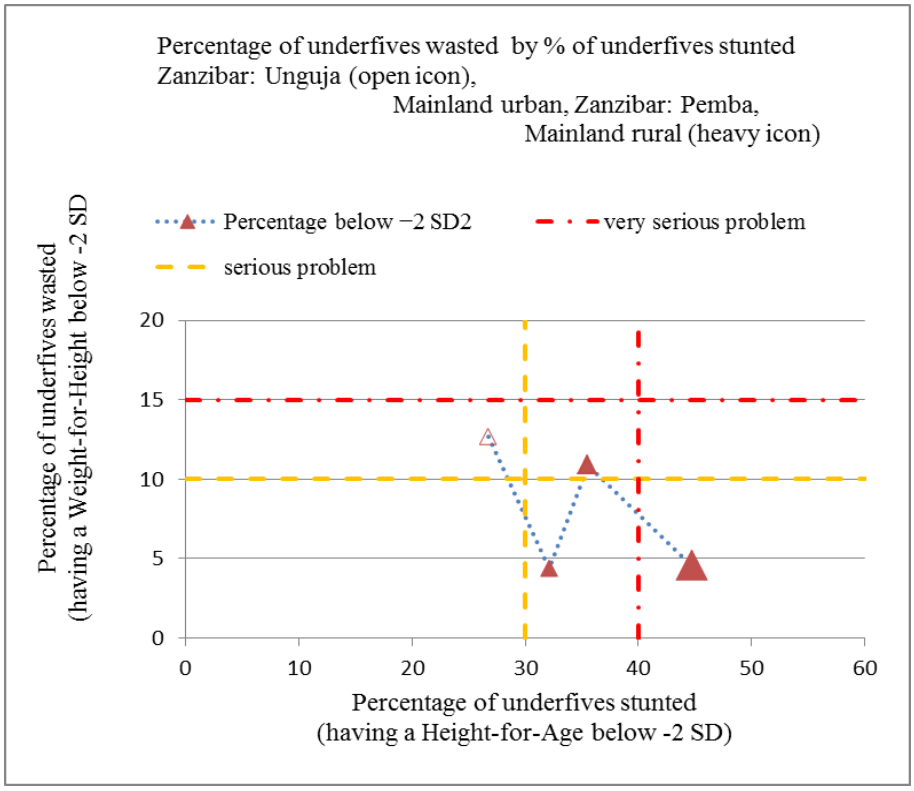


Figure 15e: Tanzania 2010: under-nutrition differences between regions

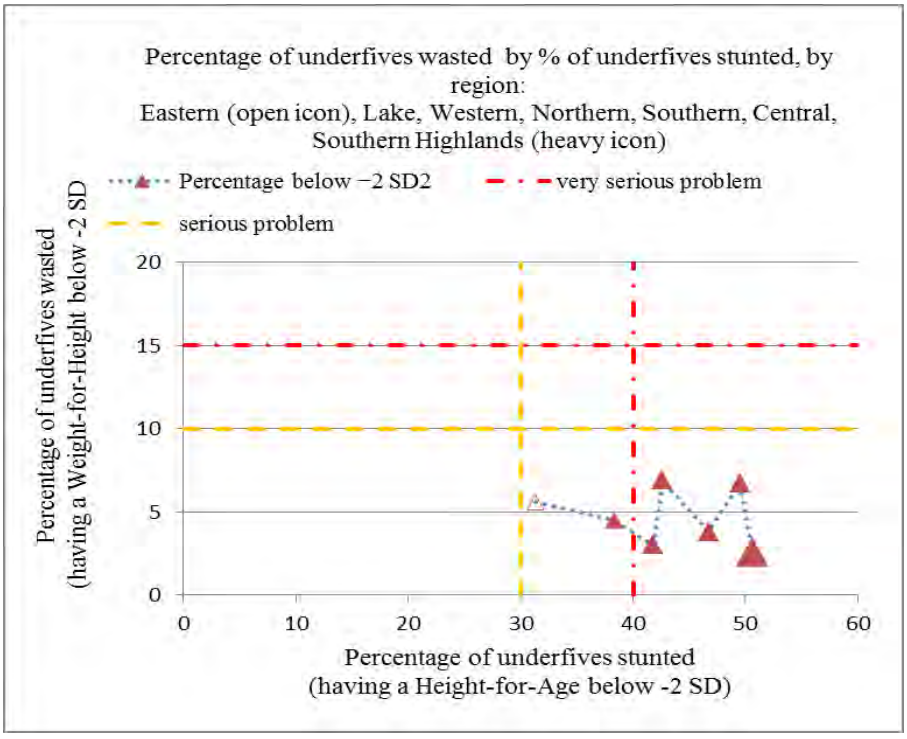


Figure 15f: Tanzania 2010: under-nutrition by wealth group (income quintiles)

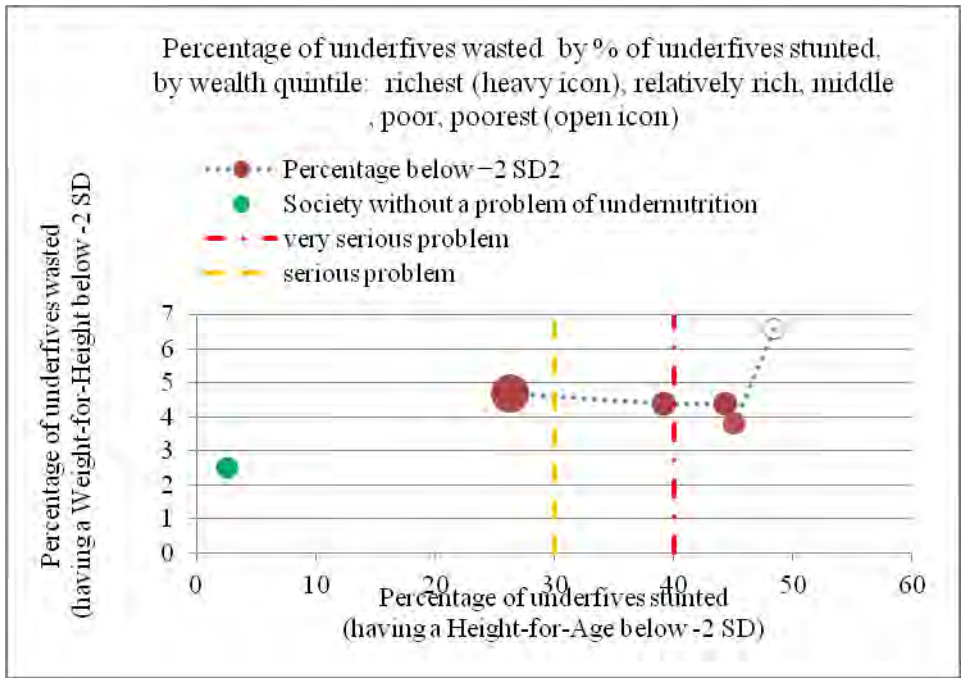
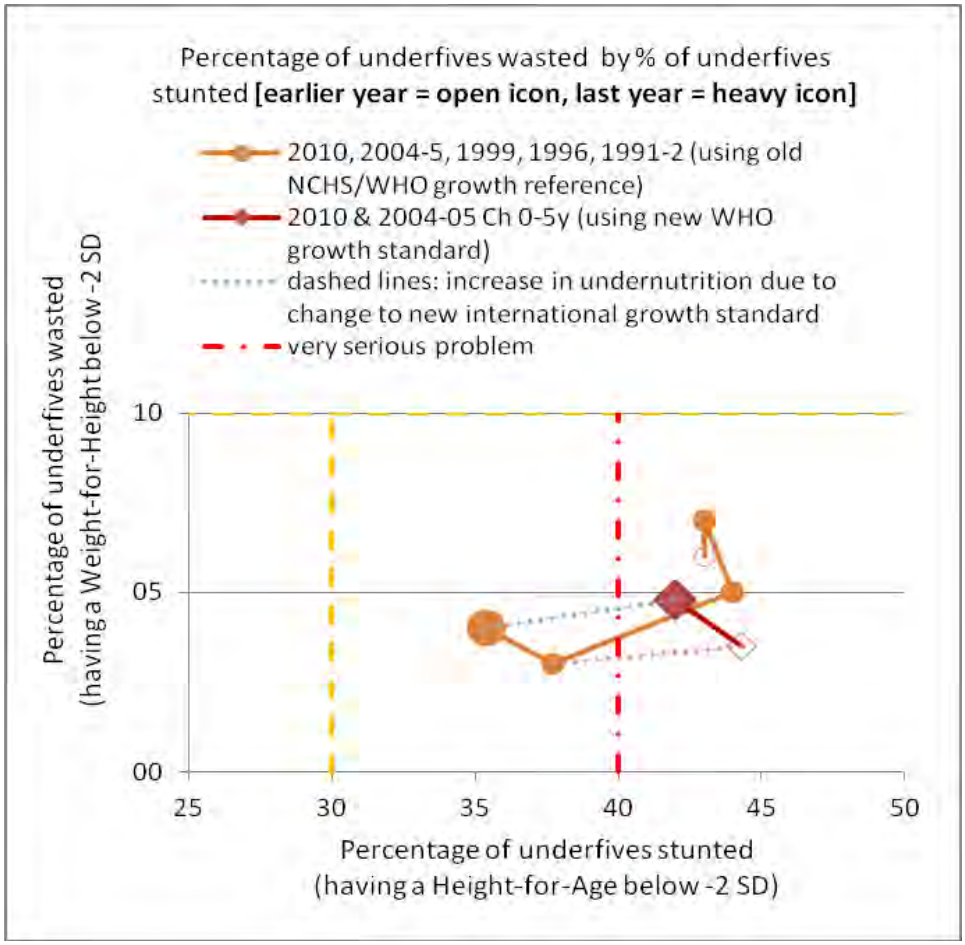


Figure 15g: Tanzania: under-nutrition dynamics 1991-2010



The Food and Agriculture Organization produces an alternative hunger estimate ('Prevalence of Undernourishment', PoU) based on (i) average aggregate food availability (as per the annual Food Balance Sheets) and (ii) a statistical procedure, based on budget-consumption survey data, to generate a fictitious 'distribution' of that food over income classes. The PoU is an estimate of the number of people (all ages combined) that are chronically hungry in the country in a given year. Figure 16 shows that there was a strong increase in hunger in Tanzania between 1990 and 2000, which brought it at a level 10% higher than in Sub-Saharan Africa as a whole. Afterwards, hunger has somewhat subsided, but the PoU remains higher than the SSA average.

Figure 16: Trend of the prevalence of undernourishment (PoU) in Tanzania compared to the trend in Sub-Saharan Africa as a whole

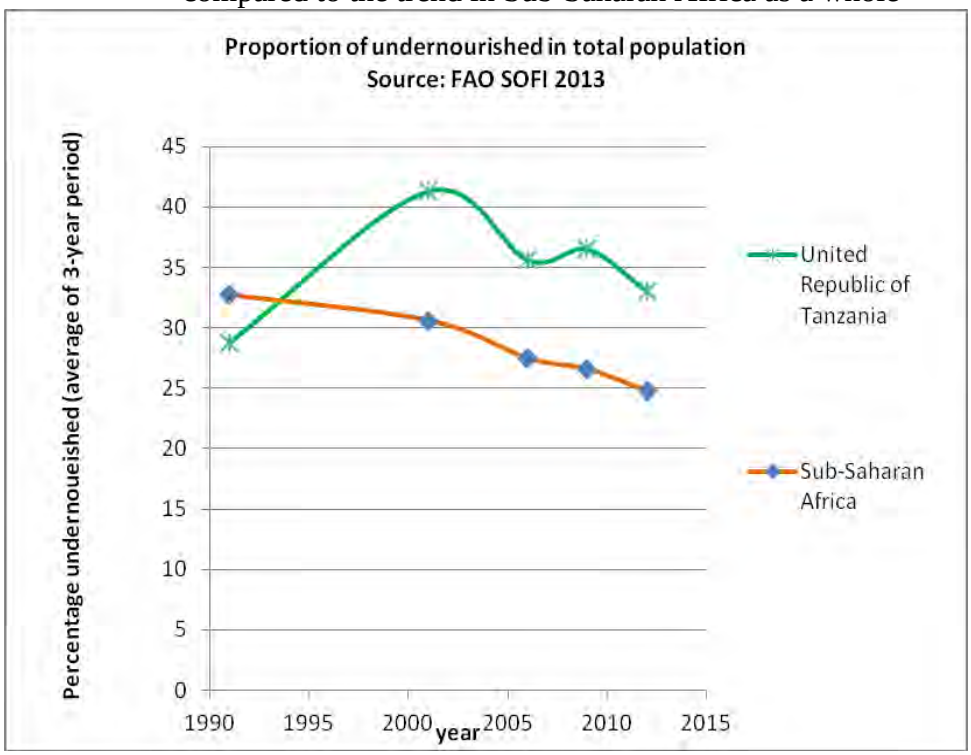
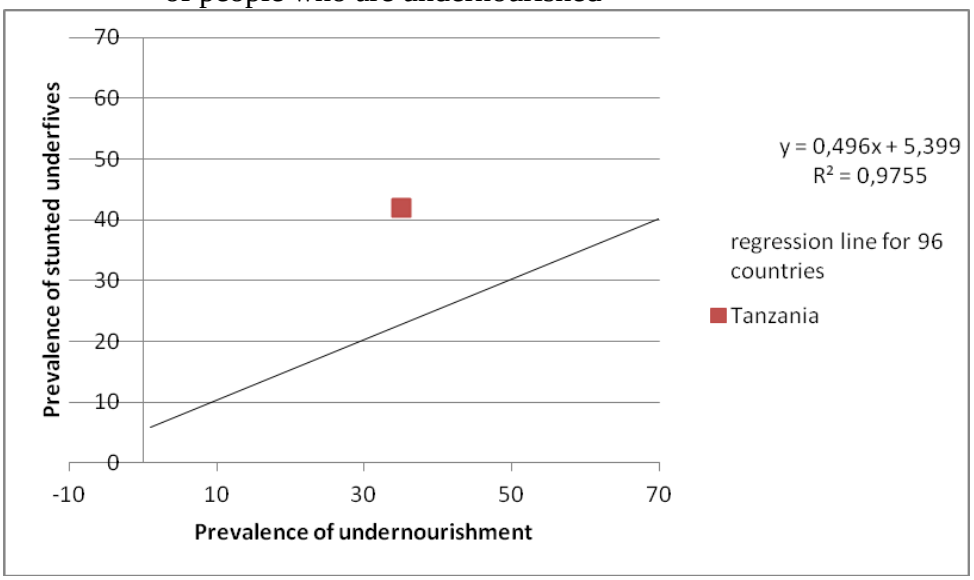


Figure 17 indicates the position of Tanzania of the two indicators (hunger and child under-nutrition) on a background canvas of an international analysis based on 96 countries. The graph shows that for a prevalence of undernourishment of 33% (which is the current Tanzanian figure according to The State of Food Insecurity in the World), the international regression line would predict a prevalence of stunting of about 22%. Instead, in Tanzania the prevalence of stunting among under-fives is almost twice as high as predicted (44.3% and 42% according to the DHS anthropometric surveys of 2004-5 and 2010, respectively).

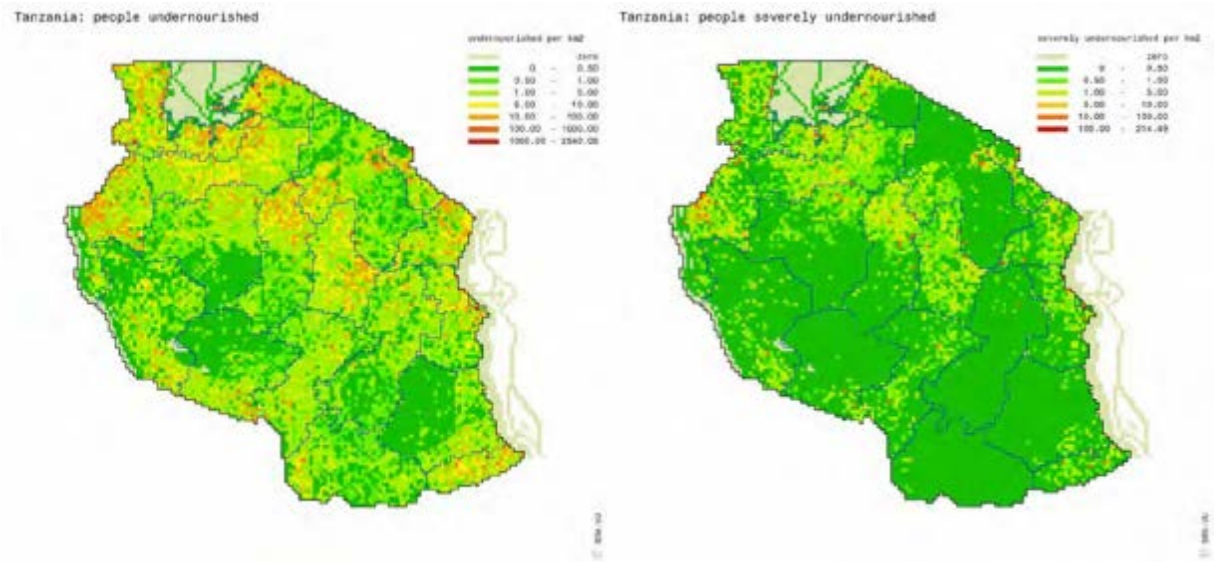
Figure 17: Position of Tanzania in the international relationship between the percentage of children who are stunted and the prevalence of people who are undernourished



Source: Analysis of 96 countries in FAO's The State of Food Insecurity in the World 2013

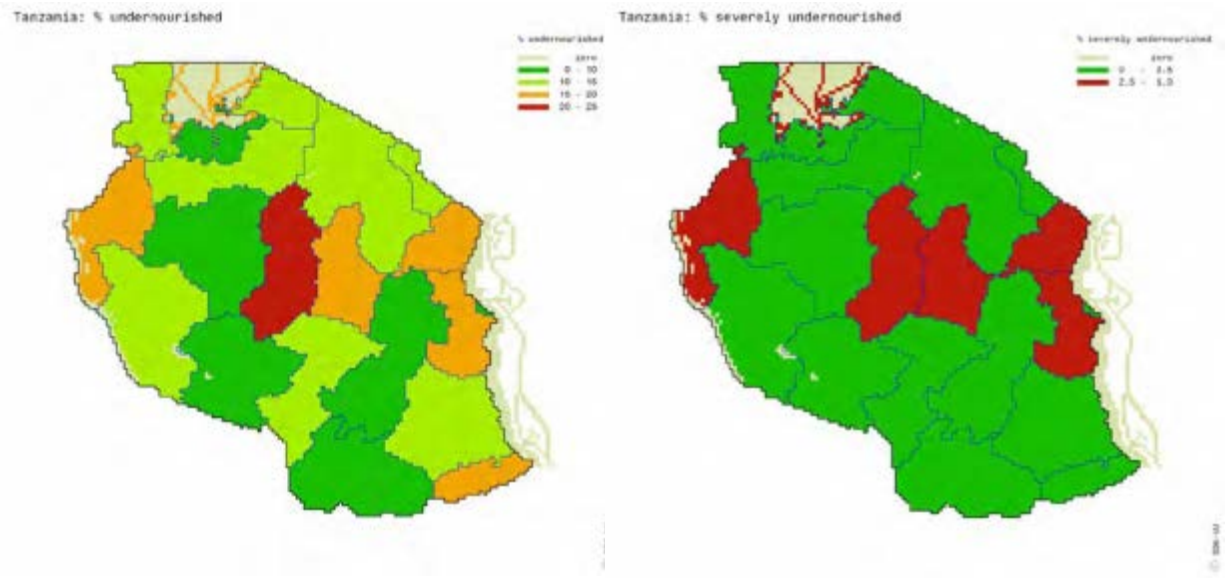
The areas of under-nutrition and severe under-nutrition also appear on Tanzanian maps, as produced by the Centre for World Food Studies in Amsterdam, see Figure 18a/b, and 19a/b.

Figure 18a/b: Undernourished and severely undernourished areas in Tanzania



Source: *Van* Wesenbeeck, C.F.A. & M.D. Merbis (2012), *Africa in Maps, data repository of the food economy in Sub-Saharan Africa*. Amsterdam: Centre for World Food Studies.

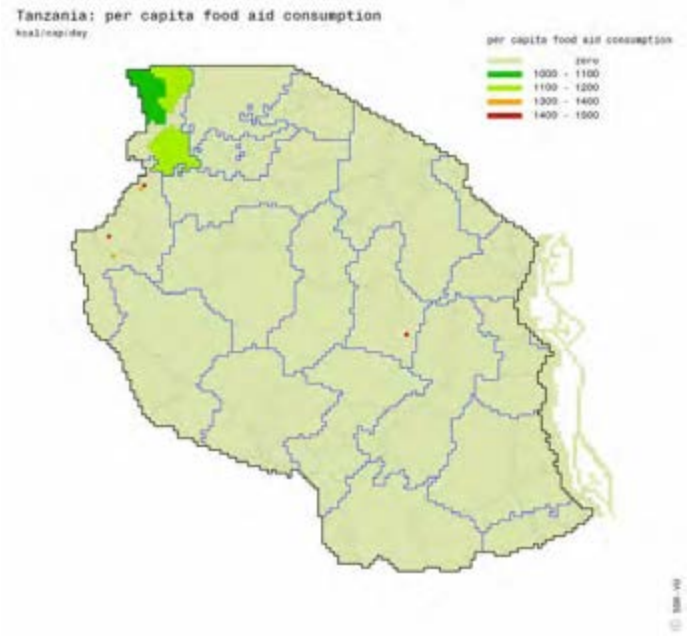
Figure 19a/b: Number of people undernourished and severely undernourished in Tanzania



Source: *Van* Wesenbeeck, C.F.A. & M.D. Merbis (2012), *Africa in Maps, data repository of the food economy in Sub-Saharan Africa*. Amsterdam: Centre for World Food Studies.

Food aid has become a standard element of food provisioning in some of these regions in Tanzania, particularly in the Northwest, an area with a lot of refugees. Figure 20 gives some details.

Figure 20: Food aid in Tanzania: regional distribution of per capita food aid



Source: *Van* Wesenbeeck, C.F.A. & M.D. Merbis (2012), *Africa in Maps, data repository of the food economy in Sub-Saharan Africa*. Amsterdam: Centre for World Food Studies.

5 DRA/ASC-AFCA research questions for Tanzania

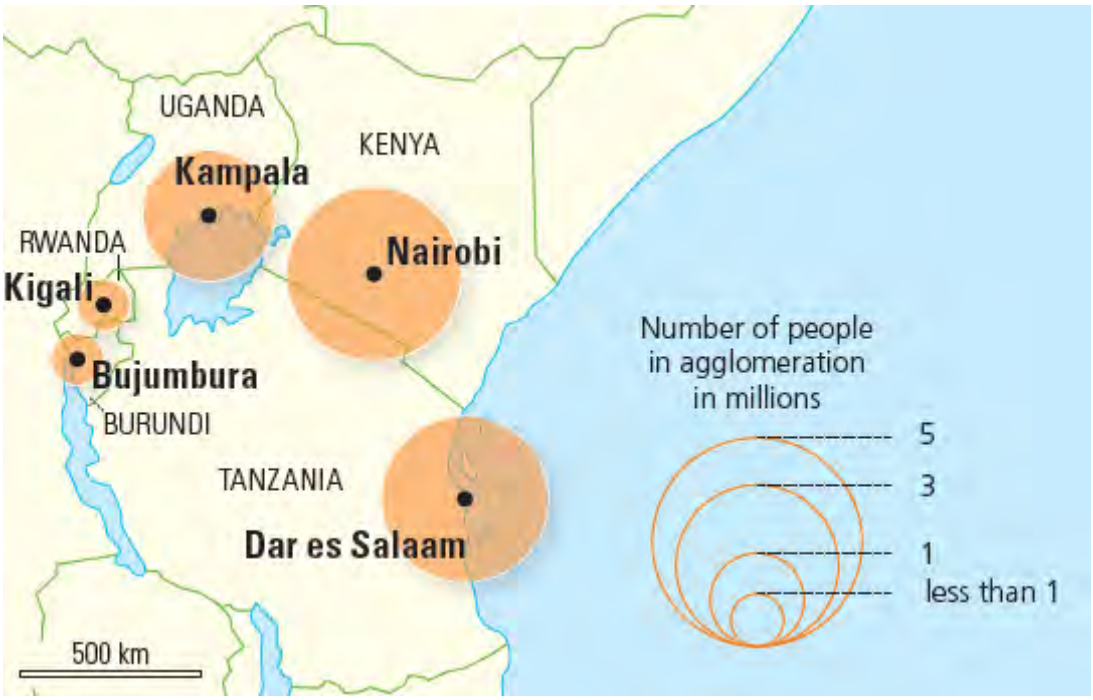
On average, Tanzania could feed its population with its own staple food production only during part of the fifty-year period under consideration: during the 1980s and 1990s and after 2000. However, the consumption data show a much more problematic situation with signs of severe food insecurity before the mid-1970s and again during the 1990s and barely enough in the 1980s and in recent years. Around 2005 major parts of the country show serious food deficiencies. Child under-nutrition figures do show a serious problem in terms of chronic and acute food insecurity. Yet, like elsewhere in Africa, the agricultural production situation in the last decade shows many good signs. Many crops had production, yield and acreage figures in 2010 that were the highest in recorded history. Also livestock numbers further increased, although - taken together - below the high population growth rates. During the last decade the most successful major crops were sweet potatoes, groundnuts and bananas (however, bananas very recently experienced severe problems because of *mnyauko* [wilt] in banana growing regions)

In follow-up studies we would like to find out what made these crops so successful: market expansion, institutional arrangements (value-chain and agro-support institutions, including business development) and/or state support?

Market expansion mainly has to do with the expansion of the internal market in Tanzania itself. According to FAOSTAT data, very little food is exported (although there will be food [crop and livestock] trade across the borders – to and fro), particularly with Kenya, Rwanda, Burundi and Mozambique, and part of that might go unrecorded. As everywhere else in Africa, Tanzania's urban population is rapidly increasing. Its largest city, Dar es Salaam, currently has close to 4.4 million people[3][4] (see Figure 21). Currently, Tanzania's urbanization rate is 29%, coming from a very low figure (5%) in 1960.[5] Beyond Dar es Salaam there are currently eleven other cities with more than 200,000 inhabitants: Kahama (0.2 m.) and Tabora (0.2 m.) in the northwest, Mwanza (0.7 m.), Arusha (0.4 m.) and Tanga (0.3 m.) in the north, the capital city Dodoma (0.4 m.) and Morogoro (0.3 m.) in the centre, Mbeya (0.4 m.), Sumbawanga (0.2 m.) and Songea (0.2 m.) in the southwest and Zanzibar city (0.2 m.) off the coast (according to the Population Census 2012). The last ten years, Tanzania's economy is booming, and particularly its urban economy. Gradually, the urban consumers increase their demand on urban hinterlands and provide markets for agricultural production growth and innovation. It can also be expected that food insufficiency in nearby countries like Kenya and Burundi increases demand for Tanzania's agricultural produce.

3 Census 2012
4 From ASC Thematic Map: 'Africa: from a continent of states to a continent of cities' (2012).
5 http://www.indexmundi.com/facts/tanzania/urban-population.

Figure 21: Urbanization in Tanzania and neighbouring countries



Source: ASC Thematic Map 2012.

6 An inventory of relevant background information

A quick search of relevant sources in the academic and non-academic literature available in and around the African Studies Centre in Leiden and on the web gives us the following recent sources, which may be helpful for further preparations of the systematic comparative study that we envisage, as far as Tanzania is concerned. The search has been limited to sources published between 1993 and 2013, and only if Tanzania has been explicitly mentioned. We start with more general literature about what may be called 'agricultural dynamics', continue with literature about Tanzania's food security and nutrition situation and end with specific attention for the three agricultural products that we would like to study: sweet potatoes, groundnuts and bananas. Where available as a free online source we also give the URL.

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7. Useful links on food and nutrition security

http://www.ascleiden.nl/?q=research/projects/food-security-and-african-city-clustering-metropolitan-food-chains	ASC-AFCA Collaborative Research Group: Agro-Food Clusters in Africa (AFCA) This ASC collaborative project on Food security and the African city aims to explore and unpack dynamic urban food systems in Africa. The research outputs of this collaborative project are intended to, in part, serve as inputs for ongoing discussions between the Ministry of Foreign Affairs (MinBuza), the Ministry of Economic Affairs, Agriculture and Innovation (EL&I), the Netherlands African Business Council (NABC), Wageningen University (WUR), and the ASC, amongst others, about the establishment of 'Agro-Food Clusters' (AFC) in and around African cities.
http://www.ascleiden.nl/?q=research/projects/africa%E2%80%99s-food-and-nutrition-security-2010-2050	Africa's food and nutrition security: 2010-2050 This research programme will predict the food and nutritional needs of a number of African countries up to 2050 on the basis of: population size, growth rate and composition nutritional requirements by age and sex, and taking activity levels into account demands for various foods Intra-country and cross-country comparisons will be made regarding the choice of crops grown and the animals kept, and food consumption patterns (depending on dietary preferences, incomes and prices). Estimates will be made of the loss to human health and the economy. The projected demands of the future food basket on natural resources (land, water, fertilizer and energy) and the effects of emissions will also be assessed.
http://www.ascleiden.nl/?q=content/webdossiers/food-insecurity-famine-and-drought-africa	Food (in)security, famine and drought in Africa The African Studies Centre's library has compiled this web dossier to provide background information on the food (in)security situation in Africa. This coincides not only with the current food crisis in the Horn of Africa but also with the recent decision by the Dutch government to choose food security as one of the focal points of its economic and development cooperation policy.
http://www.ascleiden.nl/?q=content/asc-catalogue	ASC Catalogue This unique African studies database contains titles of monographs, journal articles and chapters from edited works. Most entries include professional in-depth abstracts. Access to the ASC catalogue is free of charge. Access is available via the Web.
http://www.pbl.nl/en/publications/2012/food-security-in-sub-saharan-africa-an-explorative-study	Food security in sub-Saharan Africa: An explorative study, Report | 02-07-2012 The agricultural production potential of sub-Saharan Africa would be sufficient to make the region food secure. Concerted and region-specific policies are needed to conserve and enhance the natural resource base of soil and nutrients, to make economic growth more beneficial for the poorest populations, and to eradicate the worst cases of malnutrition and food insecurity. In an exploratory study, PBL has analysed environmental and socio-economic trends and identified feasible policy directions at national and international levels.

http://www.sow.vu.nl/	Reporting and research of the world food situation Understanding and assessing the developments of the world food situation is a permanent and broad based activity of the Centre that covers, among others, the evolving status of malnutrition, agricultural and food policy, natural resource management. The world food situation often serves as motivation for fundamental issues in food and development policy, which are to be disseminated both to policy makers and the general public. With respect to the world food situation the Centre focuses on selected topics that need to be signaled more prominently. One example of recent research on food trends is the pressure that may arise in cereal markets due to the strong increase of meat consumption in fast growing developing countries.
http://apf-down2earth.ning.com/	Agriculture, Food Security and Climate Change How farmer entrepreneurs deal with the challenges
https://www.wageningenur.nl/en/Dossiers/file/Dossier-Food-security.htm	Dossier Food security. The world's population is increasing quickly, and it is predicted to grow to 9 billion people in 2050. In less than forty years the earth will gain 2 billion extra inhabitants who will also have to live, work and eat. Fortunately, our prosperity is also predicted to increase, which means that diets will be subject to change.
https://www.wageningenur.nl/en/show/Researchers-combine-food-security-knowledge.htm	Scientists investigating world food issues should unite themselves to provide a sound scientific basis for food security policies. "The way climate scientists have organised themselves in the IPCC, but then a lighter version." That idea arose during the First International Conference on Global Food Security 29 September - 2 October 2013 in Noordwijkerhout, The Netherlands, organised by Wageningen UR (University & Research centre) and publisher Elsevier. The scientific journal Global Food Security - published by co-organiser Elsevier - will also get a special issue with all results from the conference.
http://www.9billiontofeed.com/en/gafsr.htm	The Global Alliance on Food Security Research Six leading agri-food universities and research institutions (WUR, INRA, EMBRAPA, UC Davis, Massey Univ, IVF-CAAS) have joined forces to find ways to increase the world food production in a sustainable manner.
http://seasofchange.net/	Seas of Change: scaling inclusive agro-food markets "From Islands of Opportunity to Seas of Change" The coming decades require an unprecedented change in global agriculture and food systems to assure food security. Agriculture offers the best opportunity for the estimated 2 billion people living in smallholder households to work and trade their way out of poverty. Significant impact on poverty and food security requires change at scale, both scaling up successful approaches and implementing new approaches with scale built-in to the initial design.
http://www.foodsecure.eu/	FOODSECURE for Policies that Matter The EU FOODSECURE programme aims to design effective and sustainable strategies for assessing and addressing the challenges of food and nutrition security. FOODSECURE provides a set of analytical instruments to experiment, analyse, and coordinate the effects of short and long term policies related to achieving food security. FOODSECURE impact lies in the knowledge base to

	support EU policy makers and other stakeholders in the design of consistent, coherent, long-term policy strategies for improving food and nutrition security.
http://www.gainhealth.org	Global Alliance for Improved Nutrition (GAIN) GAIN's mission is to reduce malnutrition through sustainable strategies aimed at improving the health and nutrition of populations at risk
http://gainmap.gainhealth.org/admin/pdf/Africa.pdf	GAIN Regional Fact Sheet
http://www.gainhealth.org/partnerships/amsterdam-initiative-against-malnutrition-aim	The Amsterdam Initiative against Malnutrition (AIM), a Dutch partnership model that brings different stakeholders together to improve food and nutrition security. The partners in the initiative develop innovative market-based solutions to malnutrition in Africa and Asia. The partners in AIM all bring in their own expertise. AIM was launched in May 2009 during the GAIN Business Alliance Global Forum and its goal is to eliminate malnutrition for 100 million people in Africa by 2015. AIM represents an opportunity to combine the know-how of major players in the food and nutrition industry in seven countries: Kenya, Tanzania, South Africa, Ethiopia, Nigeria, Bangladesh, Indonesia. Dutch Diamond approach – Private, Public, Civil society, Academia multi-sector approach (Dutch Diamond approach – Private, Public, Civil society, Academia) to achieve sustainable nutritional results
http://www.gainhealth.org/programs/lessons-learned-food-fortification-africa	GAIN National Fortification Alliances: Experiences in food fortification from longstanding programs. Reaching 1.5 billion individuals with fortified foods. Experiences from longstanding programs in Nigeria, South Africa, Ghana, Cote d'Ivoire, Mali, Uganda, and Egypt can provide useful lessons for programs in earlier stages including those in Senegal, Mozambique, Kenya, and Tanzania.
https://www.securenutritionplatform.org/Pages/Home.aspx	Secure Nutrition, linking agriculture, food security, and nutrition The World Bank's SecureNutrition aims to bridge knowledge gaps between agriculture, food security, and nutrition. This platform offers a space to exchange experiences and to disseminate and gather information. Please join us in our quest to foster open development through increasing coordination and collaboration in the generation and sharing of knowledge.
http://www.ifpri.org	International Food Policy Research Institute: sustainable solutions for ending hunger and poverty. A member of the CGIAR Consortium
http://www.ifpri.org/category/country/east-africa/tanzania	IFPRI Publications and Programs: Tanzania
http://cgmap.cgiar.org/start.iface?center=IFPRI	CGIAR Medium Term Research Plans
http://cgmap.cgiar.org/projectListView.iface	CGIAR Medium Term Research Plans: projects in Tanzania
http://www.cgiar.org/	The Consultative Group on International Agricultural Research (CGIAR) is a global partnership that unites organizations engaged in research for a food secure future.

http://www.cgiar.org/resources/cgiarannual-reports/ http://library.cgiar.org/bitstream/handle/10947/2789/CGIAR_Annual_Report_2011.pdf?sequence=1	CGIAR is a global partnership that unites organizations engaged in research for a food secure future. CGIAR research is dedicated to reducing rural poverty, increasing food security, improving human health and nutrition, and ensuring more sustainable management of natural resources. It is carried out by the 15 Centers that are members of the CGIAR Consortium, in close collaboration with hundreds of partner organizations, including national and regional research institutes, civil society organizations, academia and the private sector.
http://www.fao.org/publications/sofi/en/	The State of Food Insecurity in the World
http://www.fao.org/economic/ess/ess-fs/en/	Food security statistics (Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life).
http://www.fao.org/economic/ess/ess-fs/fbs/en/	Food balance sheets Food balance sheets provide essential information on a country's food system through three components: • Domestic food supply of the food commodities in terms of production, imports, and stock changes. • Domestic food utilization which includes feed, seed, processing, waste, export, and other uses. • Per capita values for the supply of all food commodities (in kilograms per person per year) and the calories, protein, and fat content.
http://faostat.fao.org/	FAOSTAT provides time-series and cross sectional data relating to food and agriculture for some 200 countries.
http://faostat.fao.org/site/291/default.aspx	FAOSTAT "Classic"
http://faostat3.fao.org/faostat-gateway/go/to/home/E	New FAOSTAT (Pilot Version)
http://www.fao.org/economic/ess/ess-capacity/countrystathome/en/	The national version of FAOSTAT, CountrySTAT, is being developed and implemented in a number of target countries, primarily in sub-saharan Africa. It will offer a two-way data exchange facility between countries and FAO as well as a facility to store data at the national and sub-national levels.
http://www.fao.org/fsnforum/	The Global Forum on Food Security and Nutrition. The FSN Forum is a worldwide community of experts and practitioners on Food Security and Nutrition issues and organizes online discussions to exchange knowledge and to inform the global dialogue and decision-making processes. With over 4500 Members from 170 countries and territories, the FSN Forum allows stakeholders such as academics, researchers, development practitioners, governments and the civil society to actively participate in the debate on topics of the global Food Security and Nutrition agenda and to provide constructive feedback along several policy formulation processes.
http://www.asareca.org/	The Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) is a sub-regional not-for-profit association. It was established in 1994 by ten member countries represented by their national agricultural research for development institutes. The 10 member countries are: Burundi, Democratic Republic of Congo, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Sudan, Tanzania, and Uganda. South Sudan joined ASARECA in 2011.

http://www.nepad-caadp.net/	CAADP stands for "Comprehensive Africa Agriculture Development Programme". CAADP is the agricultural programme of the New Partnership for Africa's Development (NEPAD), which in turn is a programme of the African Union (AU). The CAADP pillars are CAADP's four key focus areas for agricultural improvement and investment. They are 'Sustainable Land and Water Management'; 'Market Access'; 'Food Supply and Hunger'; and 'Agricultural Research'.
http://www.cabi.org/	CABI is an inter-governmental, not-for-profit organization that was set up by a United Nations treaty. CABI's mission is to improve people's lives worldwide by providing information and applying scientific expertise to solve problems in agriculture and the environment.
http://www.codesria.org/	The Council for the Development of Social Science Research in Africa (CODESRIA) is headquartered in Dakar, Senegal. It was established in 1973 as an independent pan-African research organization primarily focusing on social sciences research in Africa.
http://www.fara-africa.org/	The Forum for Agricultural Research in Africa (FARA) is an apex organization bringing together and forming coalitions of major stakeholders in agricultural research and development in Africa. It is a strategic platform that fosters continental and global networking to reinforce the capacities of Africa's agricultural science and innovation community from research, education/training, extension and civil society engaged in agriculture.
http://www.oecd.org/countries/tanzania/ (pse scroll down)	The Organization for Economic Co-operation and Development (OECD) provides a forum in which governments can work together to share experiences and seek solutions to common problems. OECD works with governments to understand what drives economic, social and environmental change. It measures productivity and global flows of trade and investment, and analyses and compares data to predict future trends. It sets international standards on a wide range of things, from agriculture and tax to the safety of chemicals.

Any enquiries, suggestions, criticisms: dietzaj@ascleiden.nl. Your assistance is welcome!

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