NGI Technical Note[1]

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Thematic Priorities and Distributions of Public Expenditures for Food System Transformation in Africa

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New Growth International (NGI) has estimated that food system transformation in Africa requires US$76.8 billion/year to 2030 (US$614 billion in total), comprising US$15.4 billion/year from the public sector and US$61.4 billion/year from the private sector. On average, this level of investment is equivalent to US$401 million/country/year, US$66/person/year, and US$123/rural person/year.[2]

Priorities emerging from country-specific deviations of indicators of food system performance from benchmark levels suggest a distribution of the US$15.4 billion/year of public expenditures across four food system interventions areas as shown in Table 1. Country-specific thematic distributions are shown in Table 2. The estimation method is detailed in the Annex.

Table 1: Estimated distribution of target public expenditures across food systems intervention areas

Food System Intervention Areas in Africa	Investment Share (%)	Investment Target (USD bill)
Crop and livestock productivity (breeding, agronomy, pest and disease control, soil and water management, extension, etc.)	35.5	5,450
Rural transport infrastructure (roads, bridges, culverts, canals, etc.)	38.5	5,914
Rural marketing and processing infrastructure and services (storage, milling, rural marketplaces, market information, etc.)	4.4	670
Direct food and nutrition support to vulnerable groups (cash and in-kind transfers, school meals, etc.)	21.6	3,314
Total	**100%**	**15,349**

The data and analysis are highly aggregated and thus must be interpreted with care. But the results are instructive of the underlying pressures and opportunities in Africa's food systems. Continent-wide, overcoming gaps in rural transport infrastructure and crop and livestock productivity have highest priority. Transfer-based interventions (i.e., direct food and nutrition support to vulnerable groups) are also vital, but overall should not exceed 28 percent of the sum of investments in the other three intervention areas. Rural marketing and processing infrastructure and services have the smallest overall share but are important because of their strong leverage on system efficiency and inclusiveness.

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[1] Citation: Omamo, S. W. and A. Mills. 2022. *Thematic Priorities and Distributions of Public Investments for Food System Transformation in Africa*. NGI Technical Note. July 2022. Nairobi and Chicago: New Growth International

[2] Omamo, S. W. and A. Mills. 2022. *Investment Targets for Food System Transformation in Africa*. NGI Technical Note. June 2022. Nairobi and Chicago: New Growth International

Table 2: Country-specific thematic targets for public expenditures (US$ mill) for food system transformation in Africa

Country	Crop and Livestock Productivity	Rural Transport Infrastructure	Rural Marketing and Processing Infrastructure and Services	Direct Food and Nutrition Support to Vulnerable Groups	Total Target	Ratio of Transfers to Investments
Algeria	365.07	197.17	58.31	195.88	816.43	32%
Angola	4.18	2.78	1.16	0.90	9.02	11%
Benin	78.84	92.31	0.00	54.38	225.53	32%
Botswana	5.93	3.81	0.00	0.54	10.28	6%
Burkina Faso	168.28	212.96	0.00	71.45	452.69	19%
Burundi	129.23	154.98	46.66	46.10	376.97	14%
Cabo Verde	0.08	0.02	0.00	0.00	0.10	2%
Cameroon	122.74	109.33	0.00	23.70	255.76	10%
Central Africa Republic	22.49	28.54	5.58	0.67	57.27	1%
Chad	258.69	72.18	22.27	127.21	480.35	36%
Comoros	13.12	17.30	0.10	3.05	33.57	10%
Congo, Dem. Rep	230.77	140.65	17.40	137.78	526.60	35%
Congo, Rep	19.59	0.00	0.87	5.48	25.94	27%
Cote d'Ivoire	38.53	0.00	42.90	72.06	153.49	88%
Djibouti	0.09	0.07	0.00	0.07	0.24	45%
Egypt, Arab Rep.	191.45	23.93	0.00	23.77	239.15	11%
Equatorial Guinea	0.46	0.36	0.11	0.21	1.14	23%
Eritrea	28.68	20.68	7.01	7.35	63.73	13%
Eswatini	15.66	0.00	1.15	2.11	18.92	13%
Ethiopia	154.26	774.87	83.74	577.46	1590.34	57%
Gabon	4.32	0.00	1.63	0.20	6.15	3%
Gambia, The	21.54	15.18	2.05	6.06	44.83	16%
Ghana	16.70	0.00	0.00	14.00	30.69	84%
Guinea	73.21	14.19	18.43	27.61	133.44	26%
Guinea-Bissau	25.10	12.61	3.34	12.15	53.19	30%
Kenya	355.73	0.00	0.00	140.63	496.36	40%
Lesotho	11.85	1.76	1.84	6.07	21.51	39%
Liberia	32.00	16.32	6.95	16.48	71.74	30%
Libya	2.66	0.69	0.44	0.69	4.48	18%
Madagascar	117.50	165.03	18.52	145.16	446.21	48%
Malawi	80.26	131.67	0.00	42.19	254.12	20%
Mali	210.92	462.90	0.00	176.12	849.94	26%
Mauritania	14.62	6.94	2.61	2.19	26.37	9%
Mauritius	3.98	1.58	0.27	0.43	6.27	7%
Morocco	315.49	339.78	93.78	337.56	1086.61	45%
Mozambique	367.28	353.20	0.00	185.52	906.01	26%
Namibia	27.15	12.00	0.00	2.60	41.75	7%
Niger	525.44	487.57	127.80	141.69	1282.50	12%
Nigeria	178.58	271.11	6.10	130.65	586.45	29%
Rwanda	127.02	230.73	0.00	5.14	362.88	1%
Sao Tome and Principe	0.19	0.67	0.00	0.13	0.99	15%
Senegal	91.10	114.81	21.39	50.52	277.83	22%
Seychelles	0.05	0.00	0.01	0.02	0.08	42%
Sierra Leone	69.73	61.63	22.70	44.36	198.42	29%
Somalia	36.89	36.28	7.37	10.32	90.85	13%
South Africa	0.00	0.00	0.00	197.34	197.34	100%
South Sudan	7.25	7.29	2.00	1.94	18.47	12%
Sudan	16.73	20.82	1.25	0.90	39.69	2%
Tanzania	512.68	613.84	0.00	92.60	1219.12	8%
Togo	64.50	59.05	5.13	40.96	169.63	32%
Tunisia	93.56	38.11	35.32	37.86	204.85	23%
Uganda	174.23	572.32	0.00	78.64	825.19	11%
Zambia	7.56	14.33	0.53	12.04	34.46	54%
Zimbabwe	16.49	0.00	3.65	3.27	23.41	16%
Total	**5450.42**	**5914.33**	**670.35**	**3314.23**	**15349.33**	**28%**
Mean	**198.20**	**109.52**	**12.41**	**61.37**	**284.25**	**19%**
Share	**35.5%**	**38.5%**	**4.4%**	**21.6%**		

Note: E = A + B+ C + D; F = D/(A + B + C]

Depending on country-specific gaps to benchmark levels, thematic targets and the appropriate ratio of transfers to investments differ significantly across countries. Table 3 compares near-term investment priorities for three countries that together capture the diversity of underlying conditions and priorities across the continent: Central Africa Republic, Ethiopia, and Kenya.

Table 3: Comparison of estimated distribution of target public expenditures across food systems intervention areas for Central African Republic, Ethiopia, and Kenya

Country	Crop and Livestock Productivity	Rural Transport Infrastructure	Rural Marketing and Processing Infrastructure and Services	Direct Food and Nutrition Support to Vulnerable Groups	Total Target	Ratio of Transfers to Investments
Central Africa Republic	22.49	28.54	5.58	0.67	57.27	1%
Ethiopia	154.26	774.87	83.74	577.46	1590.34	57%
Kenya	355.73	0.00	0.00	140.63	496.36	40%

The results suggest that **Central Africa Republic's** overall investment target of just over US$57 million/year should be concentrated on improving rural transport infrastructure and boosting crop and livestock productivity. Its relatively high level of dietary diversity compared to the benchmark (and especially compared to other African countries – see Table A2 in the Annex) suggests relatively low priority should be given to direct transfers to vulnerable groups. As is true continent-wide, the relatively small investment requirement in marketing and processing infrastructure and services would have strong leverage on system efficiency and inclusiveness.

The results suggest that with its rural road network and marketing infrastructure and services above benchmark levels, **Kenya's** overall investment target of about US$500 million/year should focus on nd boosting crop and livestock productivity and direct transfers to vulnerable groups. This is not to suggest that Kenya should not invest in roads and rural services, but rather that to improve food system performance relative to benchmarks, other areas should be prioritized.

The results suggest that **Ethiopia's** overall investment target of about US$1.6 billion/year should prioritize the rural road network and direct transfers to vulnerable groups. Ethiopia's relatively strong recent performance in agricultural productivity improvement should be sustained with significant investment in crop and livestock productivity. At almost US$84 million/year, investment in marketing and processing infrastructure and services is well above the continental mean of US$18 million/year.

Annex – Estimation Method

The estimation method builds on the analytical approach and framework underlying the NGI Index[3] and associated food systems performance benchmarks[4], and on NGI's recent estimates of investment targets for food system transformation in Africa.[5] For each country, the total target annual investment is distributed across key food system intervention areas based on deviations of relevant proxy indicators from benchmark levels. The four intervention areas and proxy indicators are shown in Table A1.

Table A1: Food system intervention areas and proxy indicators

Food System Intervention Areas	Proxy Indicator
Crop and livestock productivity (breeding, agronomy, pest and disease control, soil and water management, extension, etc.)	Cereal yield
Rural transport infrastructure (roads, bridges, culverts, canals, etc.)	Road density
Rural marketing and processing infrastructure and services (storage, milling, rural marketplaces, market information, etc.)	Logistics Performance Index (LPI) score
Direct food and nutrition support to vulnerable groups (cash and in-kind transfers, school meals, etc.)	Share of energy from cereals, roots, and tubers

The larger the gap to the benchmark for a given proxy indicator, the greater is its weight in the country's total deviation from benchmarks, and the larger is the share of expenditures allocated to the associated intervention area. The 2020 levels of the four proxy indicators are shown in Table A2for all countries. The deviations from benchmark levels for each proxy indicator are shown in Table A3. The case of Algeria is developed Table A4 as an illustration.

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[3] https://newgrowthint.com/2022/04/18/strategic-priorities-for-food-system-strengthening-and-transformation-insights-from-the-ngi-food-system-index-and-typology/

[4] https://newgrowthint.com/2022/06/14/food-system-performance-benchmarks/

[5] Omamo, S. W. and A. Mills. 2022. *Investment Targets for Food System Transformation in Africa*. NGI Technical Note. June 2022. Nairobi and Chicago: New Growth International

Table A2: 2020 levels of the four proxy indicators

Country	Cereal Yield (kg/ha)	Road Density (km/1,000)	Logistics Performance Index (Index Score)	Share of Energy from Cereals, Roots, and Tubers (%)
Algeria	1759	2.44	2.42	61
Angola	753	1.56	2.05	59
Benin	1432	1.32	2.75	68
Botswana	377.4	1.35	2.96	55
Burkina Faso	1108	0.73	2.62	64
Burundi	1248.4	1.04	2.06	61
Cabo Verde	122.8	2.43	2.46	52
Cameroon	1646	1.94	2.60	55
Central Africa Republic	945.1	0.50	2.15	52
Chad	893	2.47	2.42	68
Comoros	1370	1.01	2.56	57
Congo, Dem. Rep	769.2	1.70	2.43	73
Congo, Rep	830	3.07	2.49	61
Cote d'Ivoire	2278	3.12	3.08	68
Djibouti	2105	2.44	2.79	61
Egypt, Arab Rep.	7149	2.44	3.07	61
Equatorial Guinea	1595	2.05	2.32	61
Eritrea	652.4	1.36	2.09	61
Eswatini	1160.2	3.25	2.46	55
Ethiopia	2395	0.96	2.38	77
Gabon	1600	4.12	2.16	52
Gambia, The	841	1.55	2.40	61
Ghana	1864	3.52	2.57	65
Guinea	1187	3.38	2.20	62
Guinea-Bissau	1312	2.24	2.39	64
Kenya	1810	3.12	2.81	58
Lesotho	756	2.71	2.28	70
Liberia	1084	2.10	2.23	67
Libya	660	2.44	2.25	61
Madagascar	4004	1.14	2.39	79
Malawi	1531	0.81	2.59	63
Mali	1796	0.69	2.59	66
Mauritania	1323	2.29	2.33	55
Mauritius	5273	1.95	2.73	46
Morocco	2264	2.44	2.43	61
Mozambique	835	1.00	2.68	69
Namibia	502.5	1.94	2.76	55
Niger	555	0.78	2.07	62
Nigeria	1509	0.94	2.53	68
Rwanda	1428	0.36	2.97	52
Sao Tome and Principe	2035.4	5.93	2.65	42
Senegal	1302	1.01	2.25	66
Seychelles	1595	5.34	2.46	61
Sierra Leone	1148.8	1.47	2.08	70
Somalia	828.2	0.94	2.21	61
South Africa	4934	12.60	3.38	53
South Sudan	741.5	0.80	2.05	61
Sudan	743	0.27	2.43	53
Tanzania	1568	1.46	2.81	55
Togo	1146	1.41	2.45	70
Tunisia	1429	2.44	2.10	61
Uganda	2050	0.44	2.58	45
Zambia	2158	1.76	2.53	69
Zimbabwe	579	6.54	2.12	59

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Table A3: Country-specific relative deviations of proxy indicators from benchmark levels

Country	Cereal Yield (kg/ha)	Road Density (km/1,000)	Logistics Performance Index (Index Score)	Share of Energy from Cereals, Roots, and Tubers
Algeria	45%	24%	7%	24%
Angola	46%	31%	13%	10%
Benin	35%	41%	0%	24%
Botswana	58%	37%	0%	5%
Burkina Faso	37%	47%	0%	16%
Burundi	34%	41%	12%	12%
Cabo Verde	78%	17%	4%	2%
Cameroon	48%	43%	0%	9%
Central Africa Republic	39%	50%	10%	1%
Chad	54%	15%	5%	26%
Comoros	39%	52%	0%	9%
Congo, Dem. Rep	44%	27%	3%	26%
Congo, Rep	76%	0%	3%	21%
Cote d'Ivoire	25%	0%	28%	47%
Djibouti	38%	31%	0%	31%
Egypt, Arab Rep.	80%	10%	0%	10%
Equatorial Guinea	41%	31%	9%	19%
Eritrea	45%	32%	11%	12%
Eswatini	83%	0%	6%	11%
Ethiopia	10%	49%	5%	36%
Gabon	70%	0%	26%	3%
Gambia, The	48%	34%	5%	14%
Ghana	54%	0%	0%	46%
Guinea	55%	11%	14%	21%
Guinea-Bissau	47%	24%	6%	23%
Kenya	72%	0%	0%	28%
Lesotho	55%	8%	9%	28%
Liberia	45%	23%	10%	23%
Libya	60%	15%	10%	15%
Madagascar	26%	37%	4%	33%
Malawi	32%	52%	0%	17%
Mali	25%	54%	0%	21%
Mauritania	55%	26%	10%	8%
Mauritius	64%	25%	4%	7%
Morocco	29%	31%	9%	31%
Mozambique	41%	39%	0%	20%
Namibia	65%	29%	0%	6%
Niger	41%	38%	10%	11%
Nigeria	30%	46%	1%	22%
Rwanda	35%	64%	0%	1%
Sao Tome and Principe	19%	68%	0%	13%
Senegal	33%	41%	8%	18%
Seychelles	64%	0%	6%	30%
Sierra Leone	35%	31%	11%	22%
Somalia	41%	40%	8%	11%
South Africa	0%	0%	0%	100%
South Sudan	39%	39%	11%	10%
Sudan	42%	52%	3%	2%
Tanzania	42%	50%	0%	8%
Togo	38%	35%	3%	24%
Tunisia	46%	19%	17%	18%
Uganda	21%	69%	0%	10%
Zambia	22%	42%	2%	35%
Zimbabwe	70%	0%	16%	14%

Table A4: An illustration of the approach for Algeria

A	**Investment target (US$ million)**	816.43			
B	**Food system intervention area**	Crop and livestock productivity	Rural transport infrastructure	Rural marketing and processing infrastructure and services	Direct food and nutrition support to vulnerable groups
C	**Proxy indicator**	Cereal yield	Road density (km/1,000 people)	Logistics Performance Index (LPI) score	Share of energy from cereals, roots, and tubers
D	**Indicator level**	1,759	2.44	2.42	61
E	**Benchmark level**	2,772	3.04	2.57	51
F*	**Absolute deviation from benchmark (%)** $F_i = (E_i - D_i)/E_i$	36.5%	19.7%	5.8%	19.6%
G	**Relative deviation from benchmark (as share of total country deviation)** $G_i = F_i/\Sigma(F_i)$	44.72%	24.2%	7.1%	24.0%
H	**Expenditure level (US$ million)** $H_i = A*G_i/100$	365.10	197.17	58.31	195.88

* Where the indicator level is better than the benchmark level (higher for cereal yield, road density, and LPI; lower for share of energy from cereals, roots and tubers), $F_i = 0$