BETTER DIETS, BETTER HEALTH

Costs of Healthy Diets Briefing Paper 2

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Programme on Protective Foods that Protect the Planet, funded by The Rockefeller Foundation.

ACKNOWLEDGEMENTS

This report is authored by Professor Sir Gordon Conway with contributions from Professor Mark Burgman, Zen Makuch and Alexa Segal. The report was reviewed by ProfessorBruce German (UC Davis) with the input and advice from The Rockefeller Foundation's team. The research project is generously funded by The Rockefeller Foundation and supported by Imperial College London.

Disclaimer:

This report is based on research funded by The Rockefeller Foundation. The findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of The Rockefeller Foundation.

Suggested citation:

Conway, G.R, Burgman, M., Makuch, Z., Segal, A. (2021) Better Diets, Better Health: Costs of Healthy Diets. Briefing Paper 2. Centre for Environmental Policy, Imperial College London. UK: London.

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COSTS OF HEALTHY DIETS

Summary

According to the Global Burden of Disease supplement, many populations globally appear to have become healthier in recent years. Diet-related Disability-Adjusted Life Years (DALY's) lost, a good measure of morbidity, have declined, although type 2 diabetes has worsened. The successes in reducing background mortality have been driven by advances in technologies, innovations in health diagnostics and therapeutic advances in disease management, especially in developed countries. However, these successes have not been matched by improvements in diet-dependent health outcomes that have worsened in all parts of the world.

In particular, according to the African literature, there has been a considerable increase in the prevalence of diet-related cancers and cardiovascular disease (CVD). Obesity is also very high in South Africa and the US, although low in East Africa. Sub-Saharan Africa (SSA) is also in the midst of a rapidly expanding epidemic of type 2 diabetes. Specific variations such as these provide new opportunities to foresee and mitigate emerging health problems and to enhance diets that improve health effectively, especially in SSA.

Some countries in East Africa, such as Kenya, are undergoing a nutritional transition from a cancer-protective traditional diet to a potentially cancer-prone, more "western diet." This transition in diet is reflected in an upsurge in cancer incidence in the last few decades. The highest levels of hypertension, attributable to a changing diet, occur throughout much of Africa and are higher than in the US. In Kenya, 35 % of men and 37 % of women are hypertense; these figures have dramatically increased since the year 2000. Furthermore, there is a rapidly expanding epidemic of type 2 diabetes throughout SSA.

The concept of broad dietary guidelines seeking to educate populations towards 'Optimal' diets is now well established. In this report, we evaluate actual and optimal food intakes in SSA, noting that in Eastern and Western SSA, the intakes of legumes are in excess of the targets. Intakes of whole grains are just above the global level, and fibres well above the global level, in both cases above the North American level. However, intakes of red meat, processed meat, sugar-sweetened beverages, trans fats and sodium are well below the figures

for high income North America. Nevertheless, in most instances they are also above the recommended levels of intake for East Africa.

In the US, the real price of some foods has been declining, yet the price of foods associated with healthy outcomes in many parts of East Africa is a barrier to healthy diets. Individuals consuming an EAT-Lancet diet would require nearly 90 % of the mean per capita household income for individuals from low-income countries. There is an historical pattern of poor investment in the agriculture chain reducing affordability and accessibility of a diversity of foods. The complexity of the modern industrial food system adds to the barriers and there is an emphasis on providing sufficient caloric intakes, rather than diet quality.

Studies about the economic impact of unhealthy diets tend to underestimate the economic burden because they focus on direct health-care costs and overlook indirect costs. Poor nutrition precipitates substantial direct and indirect economic and social costs, through obesity, cancer, diabetes and other lifestyle-related diseases. Costs are borne by individuals and the wider public. However, estimates of the costs and benefits of healthy diets vary greatly in terms of methodologies and between countries. Healthy diets can help to reduce chronic disease burden. We explore the implications of our insights and provide a number of suggestions on the policy improvements that more comprehensive economic assessments may provide.

Human capital is a major input to individual and public productivity. Proper nutrition and protective diets are important determinants of labour market productivity. About 22 % of the transition growth rate of per capita income in SSA can be attributed to health.

In terms of immediate and intermediate outcomes, poor diet quality contributes to negative cognitive outcomes, which have an impact on educational attainment. An average child born in SSA will only be 40 % as productive as he or she could be with complete education and full health. A major benefit associated with increased nutrition is the potential return to human capital (especially in terms of an individuals' skills, intelligence, and education), essential for the future of East Africa's economic growth.

POLICY IMPLICATIONS

- There is an urgent need for investment in protective diets to benefit individuals and populations as well as the future economic productivity and social development of SSA.
- In SSA, consumption of protective diets is well below optimum.
- There are clear, yet so far, unsurmountable barriers to the accessibility and affordability of healthy diets in East Africa.
- Better estimates are needed of the costs of the direct and indirect economic impacts of unhealthy diets on health care.
- Investment in proper nutrition and protective diets will enhance labour market productivity and the overall economy of SSA.

This Briefing Paper, the second of a series, focuses on the Costs of Healthy Diets.

BACKGROUND

Much of what we eat is not good for us or for the planet. We consume diets that contribute to poor health and increase mortality. As we will discuss in a later Briefing Paper, producing foods contributes substantially to overuse of pesticides and fertilisers, depletion of water reserves, soil erosion and emissions of greenhouse gases.

The Rockefeller Foundation initiative has the objective of countering these trends, in part by shifting food consumption towards dietary patterns that protect against disease (see Briefing Paper no. 1).[1,2]

Eating is an intimate act and several times each day we think, even superficially, about what we are eating. But eating and drinking have profound effects on our health, lives and communities. It is often said that '*You are What you Eat*.' Originally, this phrase was first popularised by the influential 18th century French gastronome, Jean-Anthelme Brillat-Savarin, author of the classic, *The Physiology of Taste*, who advocated the hypothesis that what we ingest becomes part of the composition of our bodies. He wrote *"Dis-moi ce que tu manges, je te dirai ce que tu es"* (Tell me what you eat, and I will tell you who you are).[3] Today, it is even more pertinent, being that evidence is accumulating that our dietary intake is likely to be unhealthy for us.

[1] The Rockefeller Foundation. 2020. RF Food Initiative: Protective Foods Strategy Overview with Learning Approach slides no. 2.
[2] Flor, R. 2019. Focusing on "Protective Foods" to Reduce the Global Burden of Disease. The Rockefeller Foundation. Available from: https://www.rockefellerfoundation.org/blog/focusing-protective-foods-reduce-global-burden-disease/ (accessed 16.02.21).
[3] "Tell me what you eat: I will tell you who you are." Quote attributed to Jean Anthelme Brillat-Savarin (1755-1826), French lawyer and politician, well-known for his work as an epicure and gastronome. Wikipedia, The Free Encyclopedia. Available from: https://en.wikipedia.org/wiki/Jean_Anthelme_Brillat-Savarin (accessed: 6.04.2020)

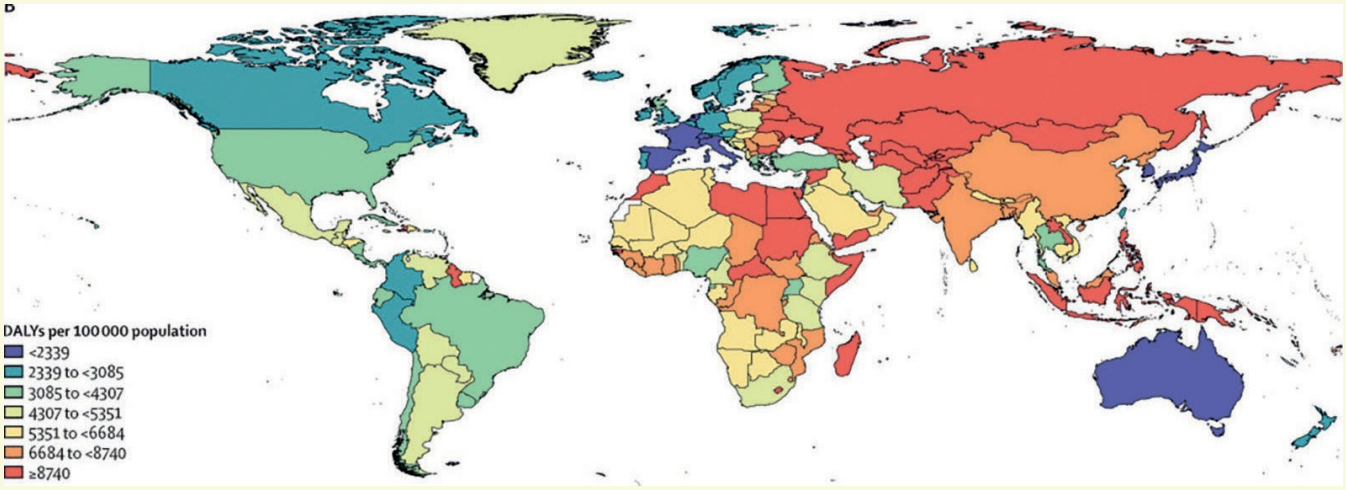
HEALTHY AND UNHEALTHY DIETS

Unhealthy diets are defined as those that may result in higher morbidity and mortality through increased cardio-vascular disease (CVD), cancers, type 2 diabetes and other diseases. In this series of briefings, we focus on diet-related illnesses in East Africa and, for comparative purposes, the US.

Globally, in 2017, dietary factors are believed to be responsible for the loss of 255 million DALY's (Disability-Adjusted Life Years). CVD was the leading cause of 207 million diet-related DALYs with diet-related cancers causing the loss of 20 million DALYs, and type 2 diabetes, 24 million DALYs.[4]

Figure 1. Diet related DALY's in East Africa and the US

For Ethiopia, Kenya and Tanzania, diet-related DALYs are 4,300-5,300 per 100,000 population. For the US the DALY's are 3,085-4,307 per 100,000 population. The DALYs per 100,000 population for Rwanda are lower and comparable with the US.



Source: Afshin, A. et al. 2019. Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. Figure 2.The Lancet 393, 1958-1972. Available from: https://pubmed.ncbi.nlm.nih.gov/30954305/ (accessed 02.03.21)

[4] Afshin, A. et al. 2019. Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 201. The Lancet 393, 1958–1972. Available from: https://pubmed.ncbi.nlm.nih.gov/30954305/(accessed 02.03.21)

Are the DALYs going down with time?

Surprisingly, the answer appears to be *yes*.

In most instances, the DALY's for East Africa and for Kenya have declined between 1990 and 2017.[5] The exception is for type 2 diabetes, where the DALYs have risen. This is also trueof the US (Tables 1 and 2).

Table 1. Age standardized DALYs attributable to dietary risks among adults at regional and SDI level for Eastern SSA in 1990 and 2017

	1990	2017
All causes	8702	5675
CVD	7451	4661
Type 2 diabetes	690	658
Neoplasms (cancers)	425	289

Source: Adapted from Afshin, A. et al. 2019. Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. Supplemental table 5. The Lancet, 393(10184), pp.1958–1972. Available from:https://ars.els-cdn.com/content/image/1-s2.0-S0140673619300418-mmc1.pdf (accessed 13.10.20)

[5] Afshin, A. et al. 2019. Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. Supplementary appendix. The Lancet, 393(10184), pp. 1958–1972. Available from: https://ars.els-cdn.com/content/image/1-s2.0-S0140673619300418-mmc1.pdf (accessed 13.10.20)

Table 2. Age standardized rates for DALYs attributable to dietary risks among adults at the national level for Kenya and the US in 1990 and 2017

	Kenya 1990	Kenya 2017	USA 1990	USA 2017
All causes	5213	4971	6204	3982
CVD	4234	3958	5201	2909
Type 2 diabetes	607	719	489	647
Neoplasms (Cancers)	297	244	488	361

Source: Adapted from Afshin, A. et al. 2019. Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. Supplemental table 7. The Lancet, 393(10184), pp. 1958–1972. Available from: https://ars.els-cdn.com/content/image/1-s2.0-S0140673619300418-mmc1.pdf (accessed 13.10.20)

According to the Global Burden of Disease Study 2017, these decreases seemed to be "driven mostly by decreases in the background mortality rate because, during the same period, the proportion of deaths and DALYs related to dietary risk remained relatively stable."[6] The background mortality rate has declined because of advances in technology and innovation in health and health care, especially in the developed countries, even though diets have not necessarily improved.

Photo by Joshua Hanson on Unsplash

[6] Op. cit. Afshin, A. et al., 2019.

EAST AFRICA

In contrast to the data in Tables 1 and 2 above, there is considerable growth of diet-related DALY's in East Africa.

Thus, the data on cancers and CVDs in Kenya tell a very different story from that of the US. (Note, however, that these outcomes are not strictly confined to diet-related morbidity.)

In **Table 3** and in **Figure 2**, Kenya stands out as the country in East Africa that has relatively high prevalence of cancer and CVD.

Table 3. Prevalence of cancers, CVD, diabetes and obesity in East Africa and the US

Country	Cancers Per 100,000 population (2012)	CVD Hypertension Prevalence (%) inadult population (2017)	Obesity Body Mass Index ≥30Kg/m² adult percentage (2017)	Type 2 diabetes mellitus Prevalence Adult percentage(2019)
Ethiopia	101-138	20-25	2.01	3.2
Uganda	137-172	25-30	2.07	1.6
Kenya	172-243	35-40	3.48	2.2
Tanzania	101-137	30-35	3.59	3.7
Rwanda	101-137	21	2.87	2.7
Burundi	101-137	22	1.36	2.4
US	243+	30-35	14.31	11.1

Source: Data adapted from multiple sources [7, 8, 9, 10, 11]

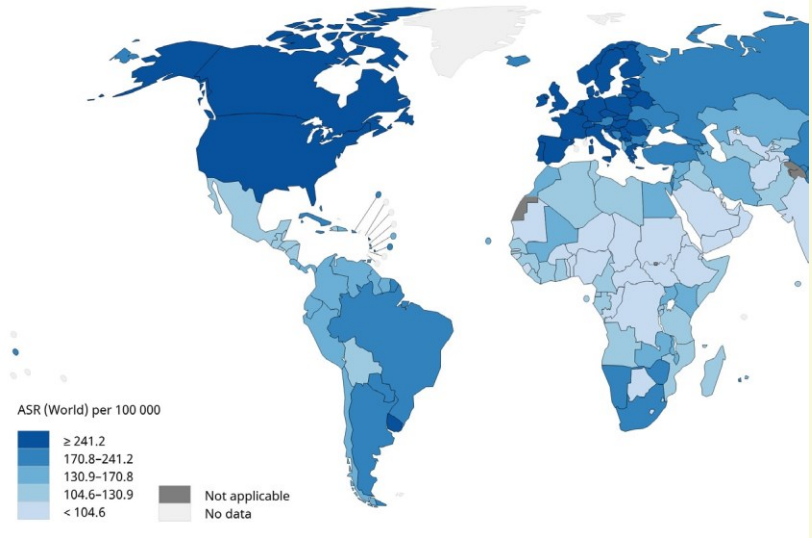
[7] Maiyoh, G.K., Tuei, V.C. 2019. Rising Cancer Incidence and Role of the Evolving Diet in Kenya. Nutrition and Cancer 71, 531–546. Available from: https://doi.org/10.1080/01635581.2018.1542010 (accessed 02.03.21)
[8] Mills, K.T., Bundy, J.D., Kelly, T.N., Reed, J.E., Kearney, P.M., Reynolds, K., Chen, J., He, J. 2016. Global Disparities of Hypertension Prevalence and Control: A Systematic Analysis of Population-based Studies from 90 Countries. Supplemental Table 1. Circulation 134, 441–450. Available from: https://doi.org/10.1161/CIRCULATIONAHA.115.018912 (accessed 02.03.21)
[9] Diabetes prevalence by country. n.d. MECOMeter, Macro Economy Meter. Available from: http://mecometer.com/topic/diabetes-prevalence/ (accessed 13.10.20)
[10] International Diabetes Federation.Diabetes Atlas 9th edition 2019 Available from: https://www.diabetesatlas.org/en/(accessed 14.10.20)
[11] Ritchie, H., Roser, M. 2017. Obesity. Available from: OurWorldInData.org. Available from: https://ourworldindata.org/obesity (accessed 13.10.20)

Cancers (Neoplasms) in Kenya

According to Dr Geoffrey Maiyoh,of Moi University, and Dr Vivian Tuei of Eldoret University in Kenya, there has been an increase in the incidence of various types of cancers in the last few decades, with diet-related cancers such as esophageal, colorectal, stomach, prostate, and breast, predominating among Kenyans.[12]

Over the past few decades, this increase has been accompanied, and perhaps, caused by a nutritional transition from potentially cancer-protective traditional diets (mostlyrich in dietary fibre, fruits, and vegetables) toa "western diet" (rich in charred red/organ meats, fat, cholesterol, sugar, and salt) that elevates cancer risks. The cancer rates for Kenya are at 172-243 per 100,000, with the rest of East Africa at 101-172 per 100,000, compared to more than 243 per 100,000 for the US (age-standardised rates).[13]

Figure 2. Estimated cancer incidence rate per 100,000



Source: © Copyright – International Agency for Research on Cancer (IARC), 2019. All Rights Reserved. Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, Znaor A, Soerjomataram I, Bray F. 2020. Global Cancer Observatory: Cancer Today. Lyon, France: International Agency for Research on Cancer. Available from: https://gco.iarc.fr/today (accessed 15.02.21).[14,15]

[12] Op.cit. Maiyoh, G.K. and Tuei. V.C., 2019.
[13] Ibid.
[14] Sung, H., Ferlay, J., Siegel, R.L., Laversanne, M., Soerjomataram, I., Jemal, A., Bray, F. 2021. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. Available from: https://doi.org/10.3322/caac.21660 (accessed 02.03.21)
[15] Ferlay J., Colombet M., Soerjomataram I., Mathers C., Parkin D.M., Piñeros M., Znaor A., Bray F. 2019. Estimating the global cancer incidence

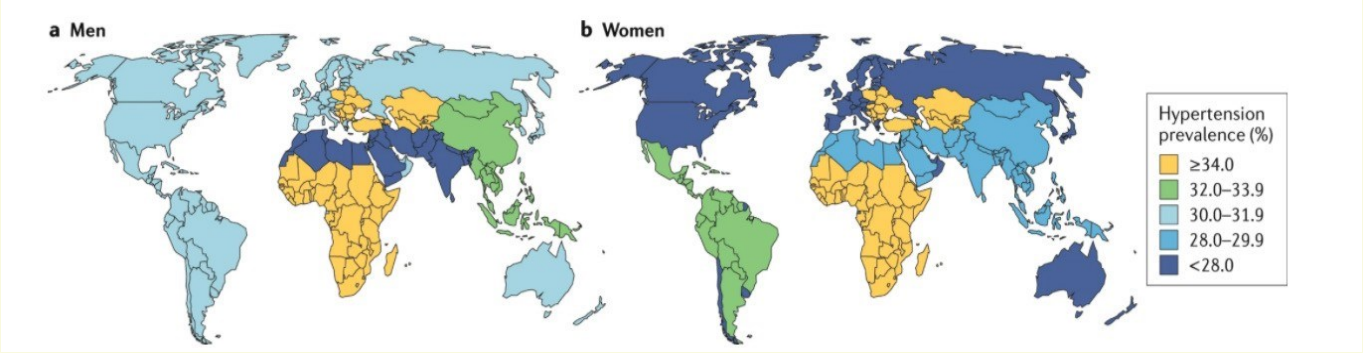
Cardiovascular Disease (CVD) in Kenya

Hypertension is now the leading modifiable risk factor causing CVD and premature death world-wide. It is caused, in part, by diets high in salt, fat, and cholesterol.

Globally, over 1.4 billion people in 2010 had hypertension.

Figure 3 reveals that high levels of hypertension occur throughout much of Africa. In Kenya, the figure in 2010 was 35 % for men and 37 % for women, showing a dramatic rise from 15 % and 13 % in 2000. Hypertension in Uganda is about 26 % and Tanzania, 26 %.[16] Nearly half of adults in the US had hypertension in 2017.[17]

Figure 3. Hypertension prevalence by world region in 2010.
Prevalence of hypertension (systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥90 mmHg or use of antihypertensive medication.[18]



Source: Reprinted by permission from Springer Nature. Mills, K. T., Stefanescu, A. and He, J. 2020. The global epidemiology of hypertension. Figure 2. Nature Reviews Nephrology, 16(4), pp. 223–237. Available from: https://doi.org/10.1038/s41581-019-0244-2 (accessed 02.03.21)

[16] Mohamed, S.F., Mutua, M.K., Wamai, R., Wekesah, F., Haregu, T., Juma, P., Nyanjau, L., Kyobutungi, C., Ogola, E. 2018. Prevalence, awareness, treatment and control of hypertension and their determinants: results from a national survey in Kenya. BMC Public Health 18, 1219. Available from: https://doi.org/10.1186/s12889-018-6052-y (accessed 02.03.21)
[17] Centers for Disease Control and Prevention. 2020. Facts About Hypertension. Available from: https://www.cdc.gov/bloodpressure/facts.htm (accessed 14.10.20).
[18] Mills, K. T. et al. 2016. Global disparities of hypertension prevalence and control: a systematic analysis of population-based studies from 90 countries. Circulation 134, 441–450. Available from: https://pubmed.ncbi.nlm.nih.gov/27502908/ (accessed 02.03.21)

Diets that are lower in sodium chloride, as well as in other components, have been observed to lower blood pressure. (Guidelines recommend reducing the daily dietary sodium intake to 100 mmol or less.)[20]

The Dietary Approach to Stop Hypertension (DASH) [19,20] is an eating plan that contains only small amounts of red meat, sweets, and sugar-containing beverages. The DASH diet is now recommended in the US national guidelines.[21]

The DASH eating plan recommends:

- Eating vegetables, fruits, and whole grains
- Including fat-free or low-fat dairy products, fish, poultry, beans, nuts, and vegetable oils
- Limiting foods that are high in saturated fat, such as fatty meats, full-fat dairy products, and tropical oils such as coconut, palm kernel, and palm oils
- Limiting sugar-sweetened beverages and sweets

In Kenya, the DASH diet may include the following foods:[22]

- Bananas – potassium lessens effects of sodium on blood pressure
- Berries, especially strawberries, are rich in flavonoids that may help reduce blood pressure
- Beets, garlic, herbs and water-melon are high in nitric acid that can help reduce blood pressure through vasodilation
- Fatty fish high in omega-3 fatty acids that can reduce blood pressure

[19] National Heart, Lung and Blood Institute (NHLBI). DASH Eating Plan. Available from:https://www.nhlbi.nih.gov/health-topics/dash-eating-plan (accessed 02.03.21).
[20] The DASH Diet for Healthy Weight Loss, Lower Blood Pressure & Cholesterol. Available from: https://dashdiet.org/ (accessed 02.03.21)
[21] Chobanian, A. V. et al. 2003. Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension. 2003; 42:1206–1252. Available from: https://www.ahajournals.org/doi/full/10.1161/01.hyp.0000107251.49515.c2 (accessed 02.03.21)
[22] Recommended Foods for Patients with High Blood Pressure. 2019. Kenyayote. https://kenyayote.com/recommended-foods-for-patients-with-high-blood-pressure/ (accessed 02.03.21).

Obesity

Another key risk contributing to poor health is obesity, resulting from consumption of high-energy foods, such as processed foods. Prevalence is measured as Body Mass Index (BMI) ≥30 kg/m2. Obesity is a cardiovascular risk factor closely linked to diet and physical inactivity.

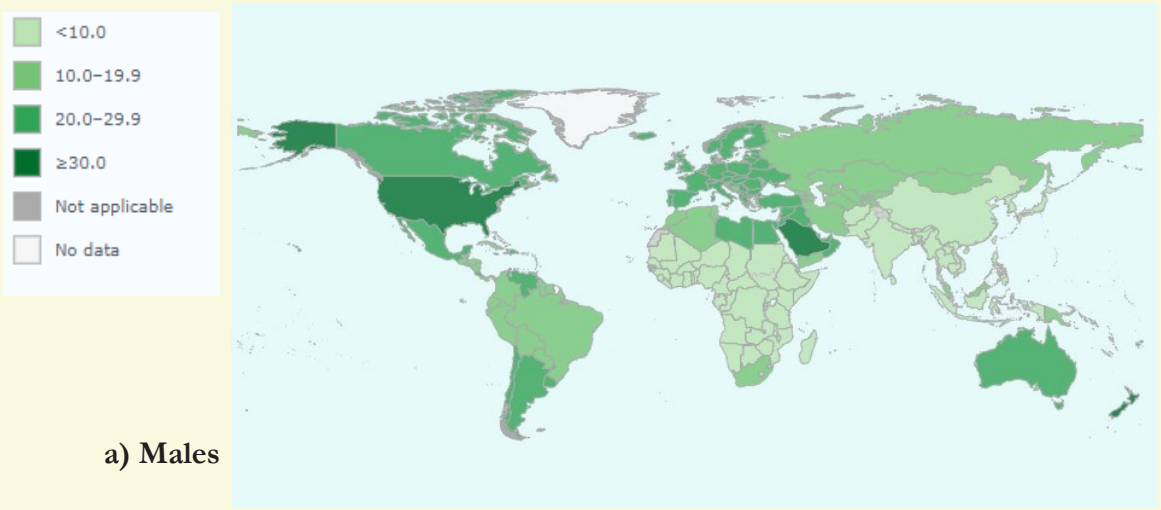
Figure 4 shows the prevalence of obesity in adults. Although the prevalence of obesity is increasing in East Africa, it remains low on a global scale (between. 1.4 % and 3.6 %). By comparison, it is very high, over 25% in the US. It is also as high in South Africa.

The prevalence of overweight and obesity among reproductive-age females in Kenya, attributable to rapid urbanisation and unhealthy lifestyles, almost doubled over a fifteen-year period between 1993 and 2008.[23] In Kenya, overweight prevalence is about 20% and 9 % for obesity, being higher among women, especially those from urban areas and/or with high economic status.[24]

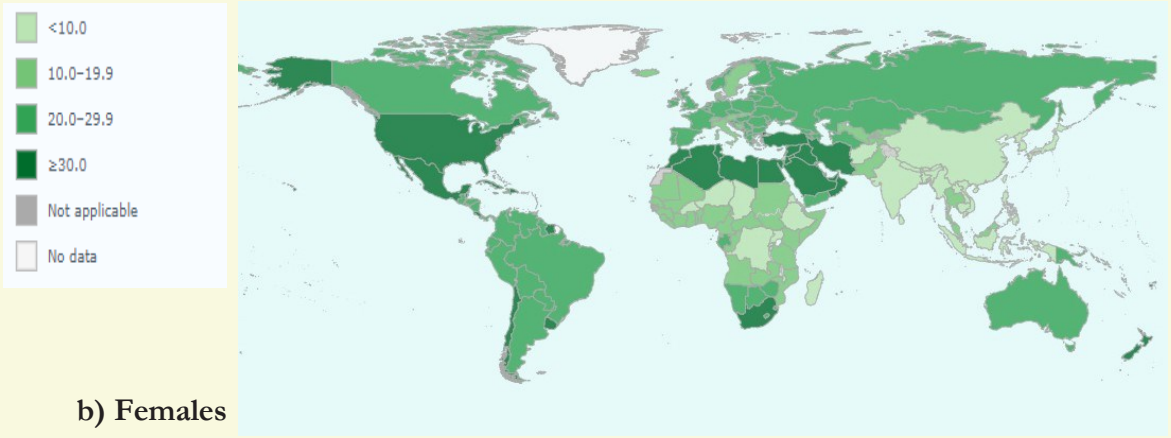
Photo by Annie Spratt on Unsplash

[23] Oti, S., Kyobutungi, C. 2011. P2-232 Cardiovascular disease conditions: prevalence, awareness, treatment and control among the urban poor in Nairobi. J Epidemiol Community Health 65, A285. Available from: https://jech.bmj.com/content/65/Suppl_1/A285.3 (accessed 02.03.21)
[24] Mkuu, R.S. 2018. Prevalence and Predictors of Overweight and Obesity Among Kenyan Women. Prev. Chronic Dis. 15. Available from: https://www.cdc.gov/pcd/issues/2018/17_0401.htm

Figures 4. Prevalence of obesity BMI ≥30 kg/m2 in a) Males and b) Females



a) Males



b) Females

Source: Reproduced from Prevalence of obesity among adults, BMI ≥ 30, age-standardized. Estimates by country. World Health Organization. Global Health Observatory data repository. 2017. Available from: https://apps.who.int/gho/data/view.main.CTRY2450A?lang=en (accessed 02.03.21) © World Health Organization 2017.

Interactive Graphs: Prevalence of obesity among adults, ages 18+, 1975-2016 (age standardized estimate): Male, 2016; Prevalence of overweight among adults, ages 18+, 1975-2016 (age standardized estimate): female, 2016.

Type 2 Diabetes

Photo by Nadine Primeau on Unsplash

The final factor contributing to ill-health in Kenya is type 2 diabetes. Globally, the incidence of diabetes, especially type 2, is growing rapidly. In 1985, an estimated 30 million people suffered from diabetes, which, by the end of 2006, had increased to 230 million, representing 6% of the world's population.[25]

Note from **Table 2** that the DALYsfor diabetes in East Africa and the US are increasing. SSA is in the midst of a rapidly expanding diabetes epidemic, over the last 25 years increasing by as much as 9 % in South Africa.[26] The national prevalence of diabetes in Kenya is about 3 %, compared with nearly 11 % in the US.[27]

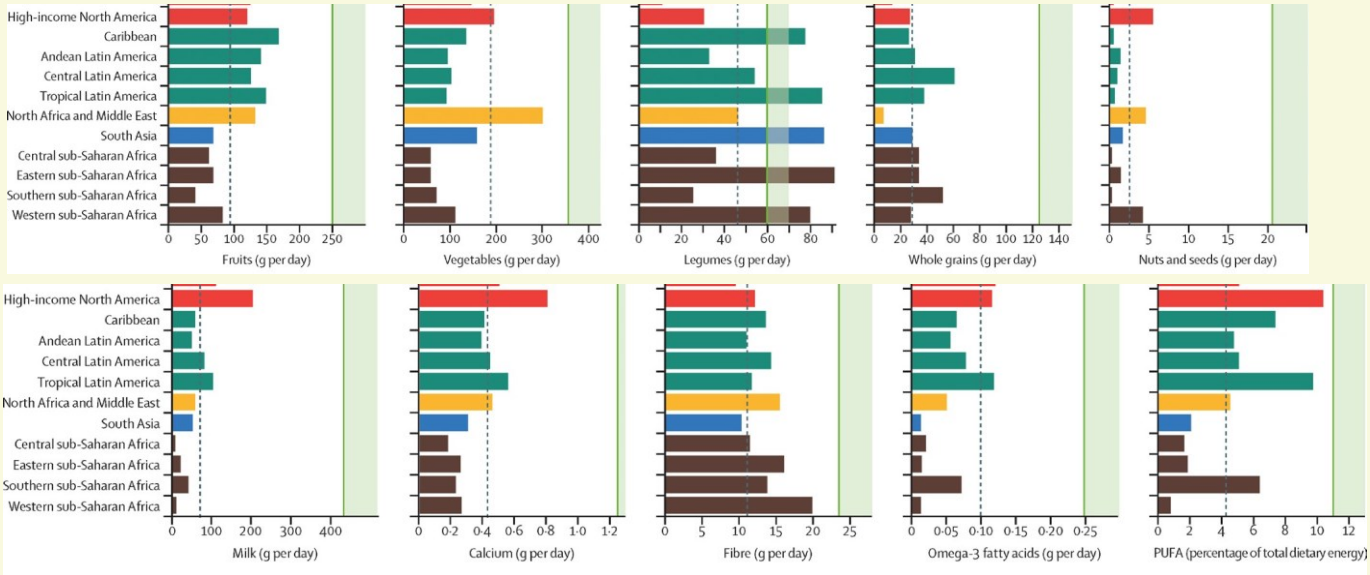
Global and Optimal levels of food intake for Kenya

The data below are taken from the Global Burden of Disease Study 2017[28] and extracted from **Figure 1** of that report, providing figures for African regions and the US. Note the graphs in **Figures 5** and **6, which** show the actual intake levels (dashed line) and the recommended intake levels in grams per day (dashed green line). The desired level of intake is the level of risk exposure that minimises the risk from all causes of death.

[25] Azevedo, M., Alla, S. 2008. Diabetes in Sub-Saharan Africa: Kenya, Mali, Mozambique, Nigeria, South Africa and Zambia. Int J Diabetes Dev Ctries 28, 101–108. Available from: https://pubmed.ncbi.nlm.nih.gov/20165596/ (accessed 02.03.21)
[26] Sinclair, A.J. 2019. Sub-Sahara Africa:The impact and challenge of type 2 diabetes mellitus requiring urgent and sustainable public health measures. E. Clinical Medicine 16, 6–7. Available from: https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(19)30187-7/fulltext (accessed 02.03.21)
[27] International Diabetes Federation.Diabetes Atlas 9th edition 2019 Available from: https://www.diabetesatlas.org/en/(accessed 14.10.20)
[28] Op.cit.Afshin, A. et al., 2019.

Global intake in 2017 - Optimal level of intake (according to the midpoint of the optimal range of intake).

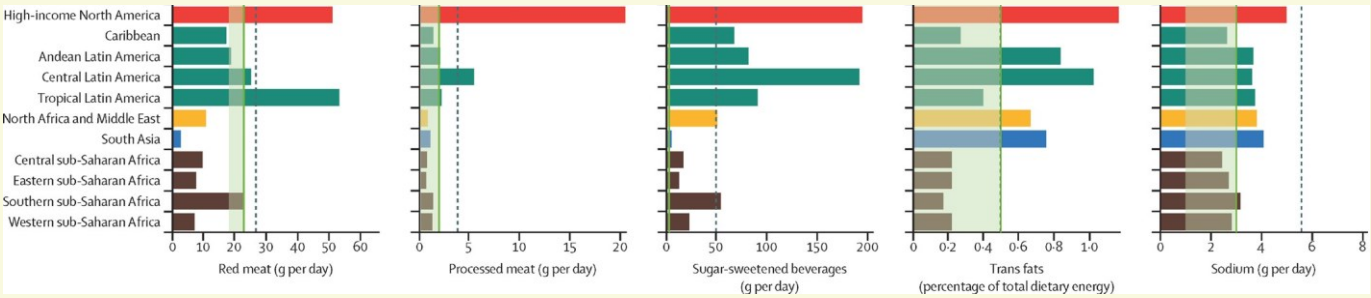
Figure 5. Global and Optimal intakes of healthy foods



Notably, in Eastern and Western SSA the intakes of legumes are in excess of the optimal intake. Intakes of whole grains are just above the global level, and fibres are well above the global level, in both cases, above the levels in North America.

In **Figure 6**, intakes of red meat, processed meat, sugar-sweetened beverages, trans fats, and sodium are well below the figures for high income North America. *Nevertheless, in most instances, they are also above the desirable level of intake for East Africa, marked by the green areas.*

Figure 6. Intakes of unhealthy foods



Source (Fig. 5 and 6): Adapted from Afshin, A. et al. 2019. Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. Figure 1. The Lancet 393, 1958–1972. Available from: https://doi.org/10.1016/S0140-6736(19)30041-8

COSTS AND BENEFITS OF IMPROVED DIETS IN EAST AFRICA

There are likely considerable economic benefits to East African people, governments, and societies if the intakes of healthy foods are increased and the intakes of unhealthy foods decreased, so potentially reducing cancers, cardiovascular diseases, and diabetes.

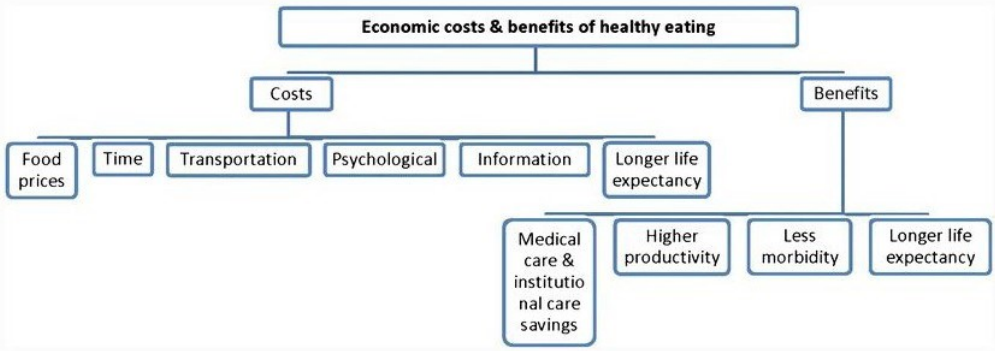
Overall costs and benefits of improved nutrition

While unhealthy diets are recognized to contribute to the prevalence of chronic disease and cancers, estimating the economic impact has proven to be a challenging endeavour. However, the information obtained from such analysis would provide policy-makers with important insights, which may lead to the development of more effective interventions aimed at improving nutrition.

A 2013 review of the costs and benefits of healthy eating in the US used evidence from economics, medicine, public health, nutrition, and psychology to explain the monetary and non-monetary incentives and disincentives associated with healthy eating, highlighted in **Figure 7**.[29]

Figure 7. The economic costs of healthy eating

From: Economic Costs and Benefits of Healthy Eating



Tree structure of the economic costs and benefits of healthy eating

Source: Reprinted by permission from Springer Nature. Anekwe, T.D., Rahkovsky, I. 2013. Economic Costs and Benefits of Healthy Eating. Figure 1. Curr Obes Rep 2, 225–234. Available from: https://doi.org/10.1007/s13679-013-0064-9 (accessed 02.03.21)

[29] Anekwe, T.D., Rahkovsky, I. 2013. Economic Costs and Benefits of Healthy Eating. Curr. Obes. Rep. 2, 225–234. Available from: https://doi.org/10.1007/s13679-013-0064-9 (accessed 02.03.21)

Most studies underestimate the economic impacts of unhealthy diets and low physical activity, typically investigating the costs on the healthcare system but overlooking indirect costs. Estimating indirect costs (for example, via lost productivity) may double the overall direct healthcare costs.[30]

Regardless of the income level of the country, the evidence is clear: poor nutrition is associated with large economic and social costs, borne by the individual and the public. However, studies that estimate the costs and benefits of diets differ in measurement tactics, economic methodologies, and frameworks.

Estimates also vary greatly between countries, which may be due to differences in attributes such as healthcare and healthcare infrastructure, disparities in socioeconomic conditions and labour costs, or agricultural markets. This heterogeneity means that analysing the potential returns on investment from improving diets is not straightforward.

The following sections explain the costs associated with unhealthy diets and the benefits associated with healthy diets, provide examples of interventions that were successful in East African settings, and conclude with policy implications for East African countries.

Photo by Doug Linstedt on Unsplash

[30] Candari, C.J., Cylus, J., Nolte, E. 2017. Assessing the economic costs of unhealthy diets and low physical activity: an evidence review and proposed framework, Health policy series. WHO Regional Office for Europe, Copenhagen, Denmark. Available from: https://www.euro.who.int/en/publications/abstracts/assessing-the-economic-costs-of-unhealthy-diets-and-low-physical-activity-an-evidence-review-and-proposed-framework-2017
(accessed 02.03.21)

The Affordability of Healthy Eating

Price

The price of healthy foods in many parts of East Africa is a barrier to healthy diets.

In contrast to the US, where the real price (i.e. price adjusted for inflation) of unhealthy foods has been declining, the price of healthy foods in many parts of East Africa is a barrier to healthy diets. In East Africa, and particularly in SSA, there is a historical pattern of poor investment in the agricultural production and distribution chain. This has led to issues with affordability and accessibility of healthy foods.

Further, many of the interventions providing nutrition to the poor in East Africa are still focused on providing sufficient caloric intakes, rather than diet quality.[31] In SSA, more than 60 % of the poor population receive their calories from staple items such as rice, and wheat, relying on nutrient fortification and biofortification.[32]

In the seminal study to evaluate the affordability of the diet recommended by the *EAT-Lancet*[33] Commission, the authors concluded that the EAT-Lancet diet was affordable for most people in high income countries but not for the global low-income population, putting it out of the reach of 1.58 billion people, mostly from SSA and South Asia.[34]

[31] Bhutta, Z.A., Das, J.K., Rizvi, A., Gaffey, M.F., Walker, N., Horton, S., Webb, P., Lartey, A., Black, R.E. 2013. Evidence-based interventions for improvement of maternal and child nutrition: What can be done and at what cost? Lancet 382, 452–477. Available from: https://doi.org/10.1016/S0140-6736(13)60996-4 (accessed 02.03.21)

[32] UNSCN. 2016. Investments for Healthy Food Systems: A Framework Analysis and Review of Evidence on Food System Investments for Improving Nutrition. Available from:https://www.unscn.org/files/ICN2_TPM/EN_final_Investments_for_Healthy_Food_Systems_UNSCN.pdf (accessed 02.03.21)

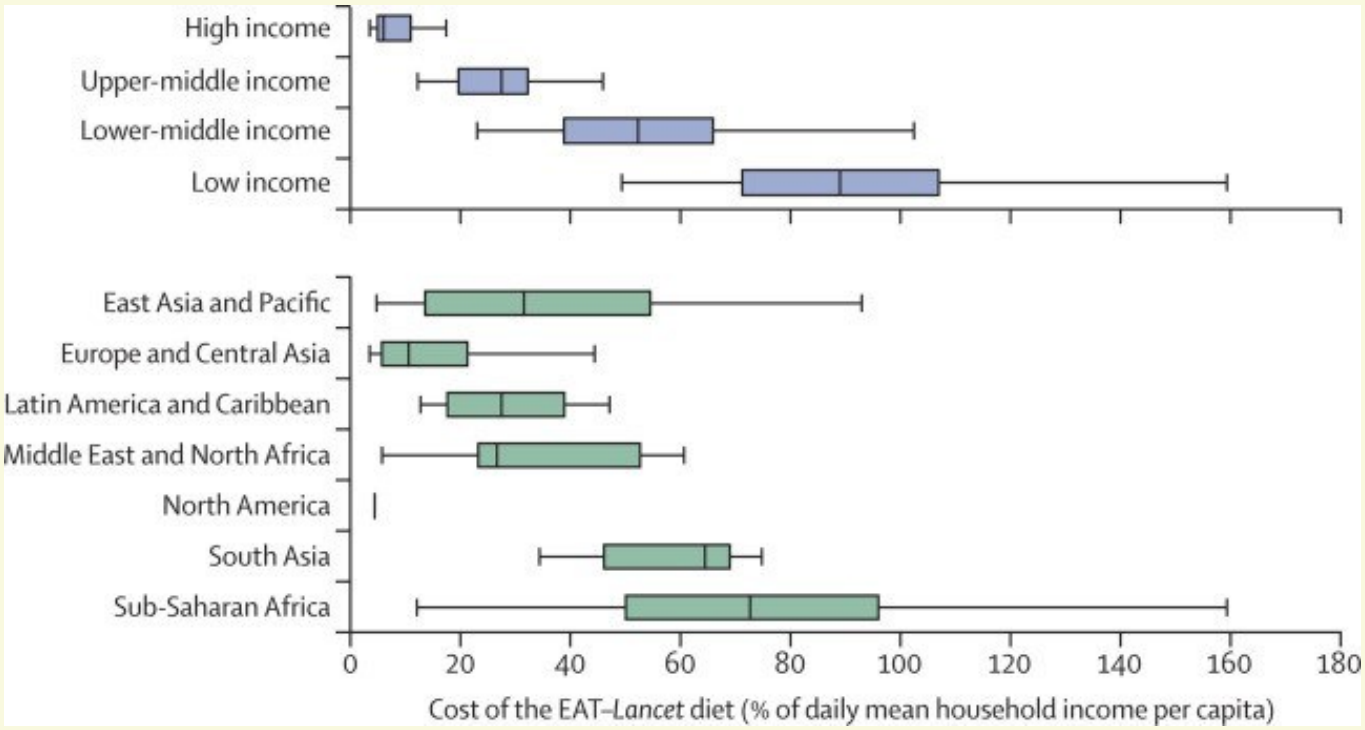
[33]The EAT–Lancet Commission constructed the first global benchmark diet capable of sustaining both human health and environmental health.

[34] Hirvonen, K., Bai, Y., Headey, D., Masters, W.A. 2020. Affordability of the EAT–Lancet reference diet: a global analysis. Lancet Glob. Heal. 8, e59–e66. Available from: https://doi.org/10.1016/S2214-109X(19)30447-4 (accessed 02.03.21)

The barrier to animal protein in East Africa is, for the most part, due to cost, which, according to Hirvonen et al (2020): *"could be explained by differences in productivity and farm-to-retail food systems in higher-income countries that feature specialized investment to supply eggs, milk, fish, and other animal-sourced foods at lower unit cost."*[35] Hirvonen et al's study showed that for individuals acquiring an EAT-Lancet diet (estimating using the least expensive, local food products) would require 89.1% and 52.4% of the mean per capita household income for individuals from low-income countries and low-middle income countries, respectively (see Figure 8 below).[36]

Figure 8. Cost of the EAT–Lancet reference diet relative to mean daily per capita household income by country income levels and major regions.

"We used price data from the International Comparison Program to estimate the cost of the EAT–Lancet diet and compared these estimates to mean daily per capita household income…The bottom and top rule marks the bottom fifth and top fifth percentiles, respectively. The vertical bar rule inside the box shows the median value for the income group or geographical region. N=141 countries"



Source: Hirvonen, K., Bai, Y., Headey, D., Masters, W.A. 2020. Affordability of the EAT–Lancet reference diet: a global analysis. Figure 2. Lancet Glob. Heal. 8, e59–e66. Available from: https://doi.org/10.1016/S2214-109X(19)30447-4 (accessed 02.03.21)

[35] Op. cit. Hirvonen et al., 2020.
[36] Ibid

Drivers of choice

The complexity of the food system adds to the barriers associated with healthy diets.

Drivers of choice include a variety of individually modifiable factors such as time and convenience, that affect an individual's ability to consume a healthy diet. For example, healthy diets often require shopping, travel, preparation, and clean-up that can be a burden on consumers with little time to spend on such activities.

Unhealthy fast-foods and convenience foods are often nearby and readily available, especially in high-income countries. Other drivers associated with the choice environment include knowledge and/or information, specific tastes, preference, and habits.

Consumer psychology and physiology, convenience, and the food environment, i.e. the consumption of large portions, fast-food advertising, and the wide availability of dessert-like foods, appear to encourage unhealthy eating habits. Since unhealthy foods are more readily available in the market than healthy ones, this drives the costs of healthy products up beyond the monetary capacity of the average consumer. Typically, consumers also bear the cost of acquiring nutrition information,[37] especially in low-income countries, where these costs are also driven by the food and agriculture systems.

Extended life expectancy

Healthy diets extend life expectancy, resulting in extra costs of age-related health conditions, though the economic benefits discussed in the next section may overshadow the costs associated with longer life expectancy.

[37] Op.cit. Anekwe, T.D. and Rahkovsky, I.,2013.

Benefits of Healthy Eating

Certain dietary patterns, as described above, reduce morbidity and mortality, and produce economic benefits, including lower medical and institutional care costs, increased productivity, improved quality of life, and increased life expectancy. We discuss the implications of these benefits in this section.

Healthcare and medical savings

Estimating the economic impacts of unhealthy diets on health care is complex.

Most of the evidence on healthcare savings come from high-income countries. Even this evidence is varied because estimating the economic impacts of unhealthy diets on healthcare and the wider society is complex; healthcare and healthcare systems are complex and heterogeneous, as are the consequences of unhealthy diets – i.e., obesity, cancers, diabetes, and other lifestyle-related diseases.

A 2017 review of the economic costs of unhealthy diets and low physical activity concluded that the medical costs associated with unhealthy diets in the US ranged from £1 to £185 per capita.[38] Elsewhere, they ranged from €143 to €156 for the United Kingdom, €63 for Australia and €3.5 for China. The promotion of healthy diets can help to reduce the chronic disease burden which accounts for 70-80% of healthcare budgets (based on European Union countries).

[38] Candari, C.J., Cylus, J., Nolte, E. 2017. Assessing the economic costs of unhealthy diets and low physical activity: an evidence review and proposed framework, Health policy series. WHO Regional Office for Europe, Copenhagen, Denmark. Available from: https://www.ncbi.nlm.nih.gov/books/NBK447219/ (accessed 02.03.21)

Human capital and productivity

Proper nutrition and protective diets are important determinants of labour market productivity and thus overall economic growth of a country.

A major benefit of improved nutrition is the potential return to human capital (individuals' skills, intelligence, education, training, etc.). According to the Human Capital Index (HCI), the average child born in SSA will only be 40% (compared to the worldwide average of 57%) as productive as they could be with complete education and full health.[39] Healthy diets are key in accelerating human capital development and are essential for the future of East Africa's economy.

In terms of immediate and intermediate outcomes, poor diet quality (i.e., inadequate nutrition) contributes to negative cognitive outcomes and educational attainment.[40] The literature is clear – those who are extremely malnourished exhibit a multitude of impacts, such as compromised reasoning and poorer school grades.

Individuals with mild or moderate malnutrition (~30% of the children in the world) also display significant deficiencies in "intellectual and behavioural functioning."[41] Proper nutrition and protective diets are therefore important determinants of labour market productivity and the overall economic growth of a country.

In 2019, the World Bank launched the Africa Human Capital Plan, to boost Africa's human capital—the health, knowledge, skills, and resilience of its people. The World Bank estimates that investments in human capital could result in annual yearly-growth of 1.8% of the countries' economies over the next 50

[39] World Bank. 2020. World Bank Africa Human Capital Plan: Game changers for investing in Africa's people. Available from: https://www.worldbank.org/en/region/afr/publication/africa-human-capital-plan (accessed 22.02.21).
[40] Whaley, S.E. et al. 2003. The impact of dietary intervention on the cognitive development of Kenyan school children. J Nutr 133, 3965S-3971S. Available from: https://doi.org/10.1093/jn/133.11.3965S (accessed 02.03.21)
[41] Ibid.

years.[42] A study that investigated health human capital on economic growth concluded that "22% and 30% of the transition growth rate of per capita income in SSA and OECD countries respectively, can be attributed to health."[43] This supports the claim that improvements to health through improved diets would result in significant economic development.

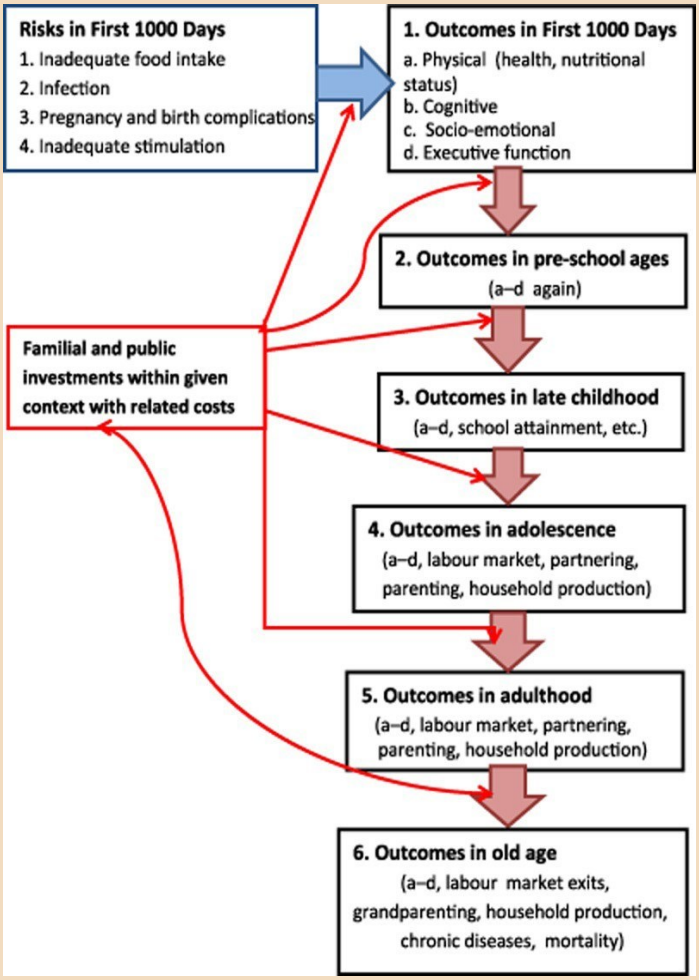
Health is a type of human capital in itself, but it is also an input to other forms of human capital.[44] Healthy diets are a crucial element of the relationship between human capital development and economic success. Human capital theory posits that health isvital to cognitive and educational outcomes in early life and is a predictor of longer-term outcomes. For example, since healthy diets are protective (against cancers, chronic diseases, etc.), they increase life expectancy, motivating and incentivising individuals to make personal investments in skill acquisition (via education and training). As such, human capital is a major input to both individual and public growth.

Previous interventions on healthy diets in East Africa have focused on the reduction of stunting. The evidence shows that height – a predictor of poor nutrition – affects individuals' future incomes, even more so in low- and middle-income than in high income countries, because it limits physical productivity in manual occupations.[45] As discussed above, indirect effects of improved diets include improved cognition, which enhances educational attainment, which later contributes to wages. A 2019 study combined the impact of stunting rates with income penalties (combining the effects on schooling, cognition and height) and estimated that "an average country's GDP per capita is 7% lower than it would have been if none of its current workers had been stunted in childhood," with the average even higher in Africa at 9-10%.[46]

[42] Op.cit. The World Bank, 2020.
[43] Gyimah-Brempong, K., Wilson, M. 2004. Health human capital and economic growth in Sub-Saharan African and OECD countries. Q. Rev. Econ. Financ. 44, 296–320. Available from: https://doi.org/10.1016/j.qref.2003.07.002 (access 02.03.21)
[44] Oster, E., Shoulson, I., Dorsey, E.R. 2013. Limited life expectancy, human capital and health investments. Am. Econ. Rev. 103, 1977–2002. Available from: https://doi.org/10.1257/aer.103.5.1977 (accessed 02.03.21)
[45] Horton, S., Hoddinott, J. 2014. Food Security and Nutrition Perspective Paper. Copenhagen Consens. 14.
[46] Galasso, E., Wagstaff, A. 2019. The aggregate income losses from childhood stunting and the returns to a nutrition intervention aimed at reducing stunting. Econ. Hum. Biol. 34, 225–238. Available from: https://doi.org/10.1016/j.ehb.2019.01.010 (accessed 02.03.21)

POLICY IMPLICATIONS

Focus on the first 1000 days



Stunting of children can be overcome by providing adequate diets in the first 1000 days of childhood.

The literature on human capital inEast African countries points to the '1000 days' theory – that is that child development depends critically on dietary intake (quality and quantity) during the first 1000 days of life after conception.[47] Policy implications include focusing nutrition and dietary interventions onthis period to ensure that young childrenand mothers receive adequate nutrition, especially within the first 1000 days post-conception. Proper nutrition and healthy diets will have beneficial effects later in life, affecting all aspects of human capital (Figure 9).

For the sake of future work on these topics, weight at age two is a good predictor of adult height and adult height is associated with wages.[48] A survey of eight low- and middle-income countries found that median hourly wages increased by 4.5% with each centimetre of adult height and that adult height tracks economic development.

Figure 9. A life-cycle approach to investments within the first 1000 day.
Source: Reproduced with permission of the corresponding author. Figure 1 A life-cycle approach to investments in the First 1000 Days in Hoddinott, J., Alderman, H., Behrman, J.R., Haddad, L., Horton, S., 2013. The economic rationale for investing in stunting reduction. Matern. Child Nutr. 9, 69–82. Available from: https://doi.org/10.1111/mcn.12080 (accessed 02.03.21)

[47] Hoddinott, J., Alderman, H., Behrman, J.R., Haddad, L., Horton, S. 2013. The economic rationale for investing in stunting reduction. Matern. Child Nutr. 9, 69–82. Available from: https://doi.org/10.1111/mcn.12080 (accessed 02.03.21)
[48] Horton, S. and R.H. Steckel. 2013. Malnutrition: global economic losses attributable to malnutrition 1900-2000 and projections to 2050. In B. Lomborg (ed.) How much have global problems cost the world?. Cambridge: Cambridge University Press.

Wholistic research mandate

Future research should focus on all parts of the 'puzzle'.

As already mentioned, there is limited evidence of the potential returns on investment associated with improved nutrition for people in East and SSA. Firstly, there is a gap in the literature on the economic impacts on health care and potential health care savings in these geographic areas. Estimating the financial impact associated with indirect costs of poor nutrition in this area will be essential for future growth – both, economic and social.

This urgency for research and development aimed at the improvement of children's diets will become a financially justifiable enterprise when the costs of not doing so are factored. Therefore, moving forward, future research should focus not only on what infants and children need in diets, but also on the infrastructure and logistics necessary to facilitate this. This research must study and account for the local environments as the means to achieve the goals associated with improved diets."

Accountability of the governing body

Many governments are forming multi-sectoral nutrition policies.

Historically, interventions in East Africa have focused on undernutrition and adequate caloric intake. However, following the advice of the Food and Agriculture Organization of the United Nations (FAO), to allow for diverse healthy diets, many organizations have employed the use of a Continental Nutrition Accountability Scorecard to hold African governments more accountable for their progress in nutrition. Based on the evidence that healthy diets support economic development, many African governments are forming multi-sectoral nutrition policies. These policies include embedding nutrition education in primary and secondary school and incorporating it in the ante-natal clinic services for pregnant women.[50]

[50] Bafana, B. 2019. Nutrition: the Best Investment for a Developing Africa. Inter Press Serv.. Available from: http://www.ipsnews.net/2019/10/nutrition-best-investment-developing-africa/ (accessed 02.03.21)

Food availability

Diets need to be affordable but also of high nutrient quality.

Research on the nutrition goals from the 2015 Millennium Development Goals (MDGs) and the WHO targets for 2025 show the potential benefits of good nutrition, specifically on stunting rates. We have only begun to understand the full implications of specific nutrients and micronutrients on diets. A study in rural Kenya designed to test the impact of different diets on school children's cognitive development concluded that diet quality, particularly increased animal protein, was positively associated with cognitive development in Kenyan children.[51] The authors of this study recommended diets including more rabbits and chickens, which are available and culturally acceptable in this region. Increasing access to animal source foods could be greatly beneficial to individuals, especially children, in low-income countries.

Attaining the essential nutrients, as outlined by the EAT-Lancet reference diet through vegetable alternatives, makes diet goals even more affordable. In the future, policy makers should focus on designing reference diets and global reports that are nutritionally focused, available, accessible, and affordable for people in low- and middle-income countries.

Some studies support the notion that lowering the prices on healthier foods would greatly benefit people in low-income countries. This could be achieved through healthy food subsidies or, according to Hirvonen et al (2020): "improvements in local production, marketing, and trade, and expanding the range of lower-cost options in each food group."[52] Careful economic design, effective policies and regulations are needed in much of SSA to reduce the price of healthy foods so that most people in low-income countries can afford healthy diets. Information on the benefits of these diets will need to be made equally accessible, so that people are incentivized appropriately to make effective changes in their eating habits.

Photo by Alexandr Podvalny on Unsplash

[51] Op. cit.Whaley et al., 2003
[52] Op. cit. Hirvonen et al., 2020.