Meat, Fruit and Vegetable Consumption in sub-Saharan Africa: a Systematic Review and Meta-regression analysis

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Background

1. The dietary choices we make affect our health and the environment and the 2030 Sustainable Development Agenda.

2. Cutting on meat (to <70g/day) & dairy products in favour of 400g of fruit & vegetables offers:
   - dual health & environmental benefits
   - reductions in GHG emissions, water & land use by 70%
   - prevent 6-10% global deaths, more cereals to feed humans
3. Important for Africa where (within next 3 decades);
   - the largest population growth and urbanisaiton
   - largest growth in NCD deaths
   - severe food insecurity issues

4. Dietary shifts in Africa—largest absolute health & environmental benefits

5. Limited review literature on meat, fruit, and vegetable (MFV) consumption in sub-Saharan Africa (SSA).

6. Therefore essential to quantify MFV consumption in SSA populations.

Objectives

This systematic review aimed to answer 3 questions:

1. How much meat, fruit and/or vegetables are being consumed daily by individuals in SSA?

2. Who is consuming the most (rural/urban; adult/children)?

3. How has consumption changed over time?

Methods

Literature Search and Study Selection

We systematically searched six databases MEDLINE, EMBASE, CINAHL, ASSIA, POPLINE and Google Scholar

Table 1: Inclusion and exclusion criteria (PICoS)

Mnemonic	Adapted PICoS	Description
P	Population or Participants	▪ Children (1 to 10 yos), Adolescents (11 to 19 yos), Adults (19+). ▪ Excluded patient population samples
I	Phenomena of Interest	▪ Meat, Fruit and Vegetables consumption (quantity, portions, servings)
C		
o	Context	▪ sub-Saharan Africa (World Bank, July 2018) ▪ No date restrictions
S	Study design/type	▪ Quantitative Observational studies (Cross-sectional, Longitudinal, Panel studies). ▪ Experimental studies with baseline data. ▪ All peer-viewed academic journals

Quality Appraisal

- Study quality was assessed with a validated tool (Louw et al., 2007).

- Studies rated against 6 key criteria on a scale of 0 to 4:
  1. Statement of study objective
  2. Clarity of study population
  3. Sampling method
  4. Response rate
  5. Reliability & accuracy of measurement method
  6. Reporting

Data Extraction

Table 2: Data was extracted on these areas:

Authors	Mean/median intake
Study type	Standard deviation/IQR
Publication date	Dietary assessment method
Study population (size, age, sex)	Country of study
Year of Data collection	Geographical context (Rural/Urban)

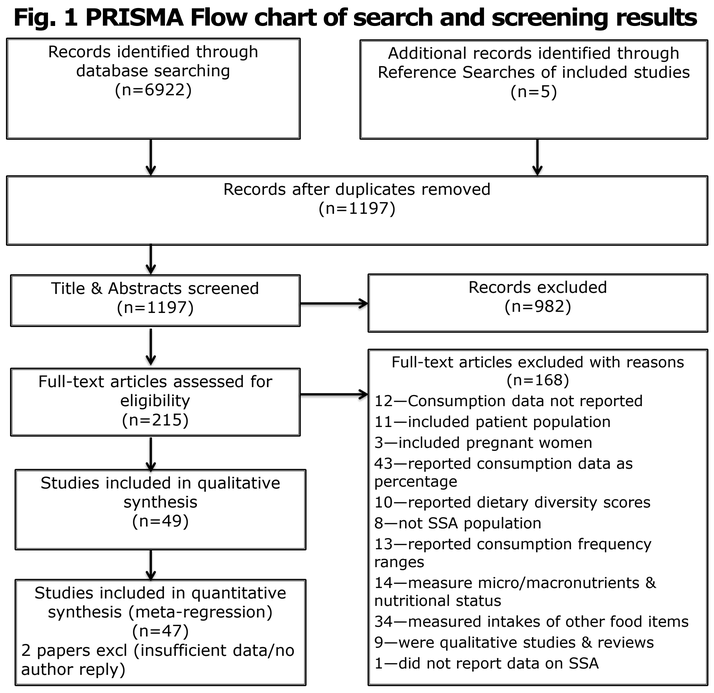
Analysis

- Meta-regression, random effects model in Stata SE 15
- Mean MFV intake regressed on 6 covariates: Year of data collection, Gender, Rural/urban residence, Country Economy, Age, and Dietary Assessment Method.

- Sensitivity Analysis: Exclusion of low quality studies

Results

Fig. 1 PRISMA Flow chart of search and screening results



Included Studies

- 47 Eligible papers
- Recorded 1977 to 2015

Covered 24 SSA countries

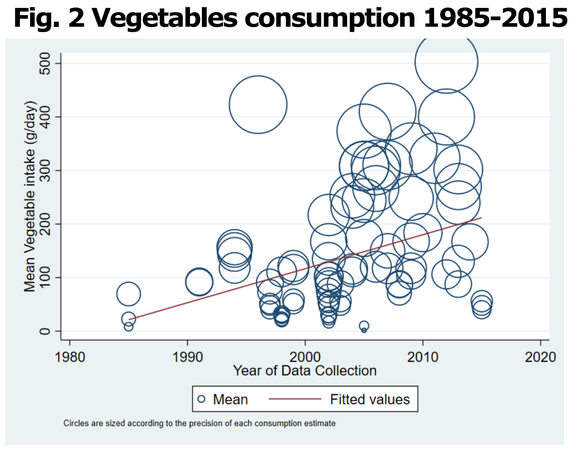
- Low Income: 50%
- Lower Middle Income: 29%
- Upper Middle Income: 21%
- Total: 100%(24)

Average Daily Consumption

- Meat: increased from (≈25g to ≈75g) [ß=0.63 (-3.51, 4.77), p=0.76]
- Fruit: increased from ≈10g to ≈37g [(ß=-1.55 (-6.30, 3.21), p=0.00)]
- Vegetable: up from ≈10g to ≈110g [(ß=4.43 (1.74, 7.12), p=0.52)]

Results of Meta-regression Analysis

Fig. 2 Vegetables consumption 1985-2015

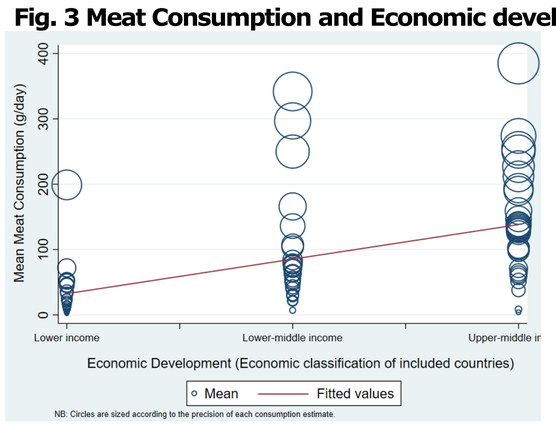


Vegetable intake [ß =4.43(95% CI:1.74, 7.12), p=0.00]

Table 3 Relationship between MFV intake and covariates

Covariate	Meat consumption		Fruit consumption		Vegetable consumption	
	Univariate Analysis	Multivariate Analysis	Univariate Analysis	Multivariate Analysis	Univariate Analysis	Multivariate Analysis
Year of data collection	ß=1.27, p=0.49	ß=0.63, p=0.76	ß=2.46, p=0.00	ß=-1.55, p=0.52	ß=2.97, p=0.00	ß=4.43, p=0.00
Gender	ß=-3.28, p=0.88	ß=3.03, p=0.87	ß=-1.43, p=0.89	ß=-0.16, p=0.91	ß=-5.40, p=0.73	ß=-0.18, p=0.93
Age (children/adult)	ß=8.14, p=0.84	ß=-14.64, p=0.74	ß=224.55, p=0.03	ß=219.87, p=0.03	ß=171.20, p=0.00	ß=80.32, p=0.08
Dietary Assessment Method	ß=-45.45, p=0.00	ß=-28.80, p=0.17	ß=-8.32, p=0.00	ß=-9.56, p=0.23	ß=0.77, p=0.94	ß=1.75, p=0.74
Country Economic Development	ß=44.32, p=0.00	ß=36.76, p=0.04	ß=5.30, p=0.50	ß=6.38, p=0.29	ß=24.58, p=0.01	ß=43.49, p=0.00
Rural/Urban Residence	ß=35.80, p=0.01	ß=15.29, p=0.40	ß=-16.60, p=0.00	ß=-9.24, p=0.20	ß=-3.83, p=0.74	ß=-25.48, p=0.00

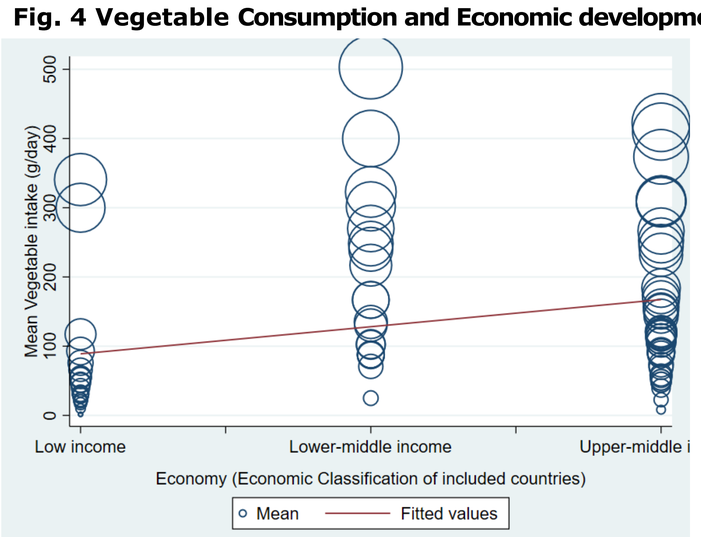
Fig. 3 Meat Consumption and Economic development



Meat intake [ß =36.76 (95% CI= 2.61, 70.91), p=0.04]

Results of Meta-regression Analysis

Fig. 4 Vegetable Consumption and Economic development



Vegetable intake [ß = ß=43.49 (95% CI: 25.96, 61.03), p=0.00]

Key Findings and Implications

Key Findings

- Average Meat consumption above WCRF/IARC* recommended 70g/day.
- Vegetable or Fruit consumption has increased but remains below WHO guidelines.
- Vegetable and Meat consumption increasing with rising incomes.
- Vegetable and Meat consumption higher in urban than rural populations.
- Rural populations more likely to meet recommended daily fruit intake.
- Fruit or Vegetable consumption decreased with age.

Implications

Rising meat consumption

Fruit and Veg. below recommended intake

- More people likely to meet protein and micronutrient requirements, but may put many at risk of NCDs.
- Producing to meet increasing demand may require more land and cereals, contribute to food insecurity.
- Climate change, health and well-being need to be properly integrated in livestock and agric production systems in SSA.

Conclusions

- While dietary changes in SSA may offer large absolute health and environmental benefits, consideration of the magnitude of dietary change, particularly reducing or increasing meat consumption, will need to occur to ensure reduction of under-nutrition and micronutrient deficiencies without worsening NCD prevalence and environmental impacts.

- Efforts need to move away from discrete sector-specific actions and objectives towards 'integrated and indivisible' actions for sustainable development.

Abbreviations and References

*WCRF/IARC: World Cancer Research Fund/ International Agency for Research on Cancer

1. UN-DESA. World Population Prospects: The 2017 Revision, Key Findings and Advance Tables. New York; 2017. Report No.: ESA/P/WP/248.

2. World Health Organisation. Global Status Report on Noncommunicable diseases 2014. Attaining the nine global noncommunicable diseases targets; a shared responsibility. Geneva, Switzerland; 2014.