Global benefits of increasing fruit and vegetable consumption for health and sustainable development

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Sustainable diets: Food systems impact on the environment



and more



1900 1910 1920 193



"Sustainable Diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and **affordable**; nutritionally adequate, safe and healthy; while optimizing natural and human resources."



- Food and Agricultural Organisation,



The impacts of dietary change on greenhouse gas emissions, land use, water use and health: a systematic review







"Optimising" diets for health and GHG emissions





Green et al. 2015. The potential to reduce greenhouse gas emissions in the UK through healthy and realistic dietary change. *Climatic Change* 129: 253.

SHEFS

"Optimising" diets for health and GHG emissions





Working towards Health and Environmental Co-Benefits



Healthy diet high in vegetables and fruits

would result in 17% lower GHG

AND 7m life years saved over 30 years

Additional health benefits can be achieved **up to 50% lower GHG**

But, above 40%, must balance **benefits vs.**

acceptability

SHEFS



Achieved GHG emissions reduction



Global Burden of Disease: % total deaths due to Low FV intake *IHME, Univ of Washington http://www.healthdata.org/*





Global Burden of Disease: DALY's lost/100,000 due to low FV intake IHME http://www.healthdata.org/





Global Fruit and Vegetable availability, affordability and consumption



PURE Study (led S Yusus, McMaster): 143,305 participants from 18 countries worldwide (rural and urban communities)

- 4 LICs; Bangladesh, India, Pakistan, and Zimbabwe
- 4 LMICs; China, Colombia, Iran, Occupied Palestinian Territory
- 7 UMICs; Argentina, Brazil, Chile, Malaysia, Poland, Turkey, South Africa
- 3 HICs; Canada, Sweden, United Arab Emirates

First global study to:

- Describe the availability and affordability of fruits and vegetables across urban and rural communities in all economic regions globally
- Relate FV affordability to consumption

Methods/data: Food frequency questionnaires, data on household income and spending

EPOCH- structured environmental audit tool in all 545 communities where >500 participants lived: inc availability of FV retail, diversity and price of FV

Availability, affordability, and consumption of fruits and vegetables in 18 countries across income levels: findings from the Prospective Urban Rural Epidemiology (PURE) study



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Summary

Background Several international guidelines recommend the consumption of two servings of fruits and three servings of vegetables per day, but their intake is thought to be low worldwide. We aimed to determine the extent to which such low intake is related to availability and affordability.

Methods We assessed fruit and vegetable consumption using data from country-specific, validated semi-quantitative food frequency questionnaires in the Prospective Urban Rural Epidemiology (PURE) study, which enrolled participants from communities in 18 countries between Jan 1, 2003, and Dec 31, 2013. We documented household income data from participants in these communities; we also recorded the diversity and non-sale prices of fruits and vegetables from grocery stores and market places between Jan 1, 2009, and Dec 31, 2013. We determined the cost of fruits and vegetables relative to income per household member. Linear random effects models, adjusting for the clustering of households within communities, were used to assess mean fruit and vegetable intake by their relative cost.

Findings Of 143 305 participants who reported plausible energy intake in the food frequency questionnaire, mean fruit and vegetable intake was 3.76 servings (95% CI 3.66-3.86) per day. Mean daily consumption was 2.14 servings (1.93-2.36) in low-income countries (LICs), 3.17 servings (2.99-3.35) in lower-middle-income countries (LMICs), 4.31 servings (4.09-4.53) in upper-middle-income countries (UMICs), and 5.42 servings (5.13-5.71) in high-income countries (HICs). In 130.402 participants who had household income data available, the cost of two servings of fruits and three servings of vegetables per day per individual accounted for 51.97% (95% CI 46.06-57.88) of household income in LICs, 18.10% (14.53-21.68) in LMICs, 15.87% (11.51-20.23) in UMICs, and 1.85% (-3.90 to 7.59) in HICs ($p_{trend}=0.0001$). In all regions, a higher percentage of income to meet the guidelines was required in rural areas than in urban areas (p<0.0001 for each pairwise comparison). Fruit and vegetable consumption among individuals decreased as the relative cost increased ($p_{trend}=0.00040$).

Interpretation The consumption of fruit and vegetables is low worldwide, particularly in LICs, and this is associated with low affordability. Policies worldwide should enhance the availability and affordability of fruits and vegetables.

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Affordability: proportion unable to afford 3 veg and 2 fruits/day







FV intake decreased everywhere as relative cost increased BUT Lowest intake was in LMIC- and linked to affordability

Mean FV intake by relative cost of 3 servings vegetables and 2 servings fruit (per person)



Relative cost of five servings (3 veg; 2 fruit) by quintile

How can we change FV consumption globally for improved health and the environment?



Table 1. A spectrum of policy instruments/tools

Family and community	Voluntary sector	Private market	Information and exhortation	Subsidy	Tax user charg	and ge	Regulation	Public enterprise	Direct provision
Voluntary action			Mixed voluntary and compulsory action					Compulsory action	
Low state in	volvement							High state i	nvolvement
School meals/FV, school based nutrition education Dietary guidelines Regulation of unhealthy food marketing Nutrition education Mass media campaigns, digital marketing Food reformulation Food fortification GP counselling Mass media campaigns, digital marketing Fat / sugar taxes "Healthy' built environment e.g. urbation transport planning for health Initiatives Interventions to support consumers' informed decision making Interventions to change the food environ and the market							althy FV Subsidies uilt urban & ing for vironment		