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Carbon-costed diets highlight redistribution needs: evidence from 165 countries

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Abstract

Food-system greenhouse gas emissions (GHGE) impose large social costs that are rarely reflected in food prices. The affordability impacts of internalising these costs remain unclear. Carbon pricing is a key instrument for internalising environmental costs, yet its application to food systems has been constrained by concerns over food affordability and distributional equity.

Here, we integrate dietary intake, country-specific environmental footprints, food prices, and income distributions with MATILDA (Micro–Macro Assessment Tool to Identify Low-impact Dietary Actions) to estimate market and carbon-inclusive dietary costs across 165 countries and socio-demographic groups. We examine how internalising the social cost of diet-related GHGE alters dietary affordability globally and regionally.

Our results reveal profound inequalities in the economic and environmental burdens of food consumption. Across regions, the inclusion of GHGE costs to food prices raises the cost of diets by 8–32%, limiting food affordability for an additional 397 million people worldwide. Low-income populations in sub-Saharan Africa and Southern Asia are particularly vulnerable, while full-pricing of diets in high-income regions has minimal impact on food affordability.

These findings underscore the importance of coupling dietary transitions with redistributive and environmental pricing policies to ensure that food system decarbonisation does not exacerbate global nutrition inequities.

Highlights

- Internalising the social cost of diet-related greenhouse gas emissions raises dietary costs by 8–32% across 165 countries
- Carbon-inclusive food pricing renders diets unaffordable for an additional 397 million people globally
- Low-income populations in sub-Saharan Africa and Southern Asia face the greatest affordability risks from dietary carbon pricing
- High-income regions experience minimal affordability impacts when full environmental costs are reflected in food prices
- Effective food system decarbonisation requires redistributive policies to prevent exacerbating global nutrition inequities

1. Introduction

Greenhouse gas emissions (GHGE) linked to food production contribute to climate change, biodiversity loss, and adverse health impacts[1], yet these externalities are rarely reflected in market prices. As a consequence, unpriced carbon emissions distort food consumption and production decisions and generate hidden environmental, health, and social costs of around $15 trillion annually[2]. In response, carbon pricing has been widely implemented across energy, transport, and industrial systems, with evidence showing that a $40 per-ton CO_2 tax covering about 30% of emissions can reduce emissions by 4–6%[3], while global carbon pricing instruments have mobilised over $100 billion[4].

Despite the food system accounting for approximately 30% of global GHGE[5], carbon pricing remains largely absent from food consumption and agricultural production[6]. In the absence of an effective price signal, incentives to shift towards lower-emission diets remain weak[7], yet modelling indicates that food price signals could cut food-related impacts by 5–6%, including about 63 Mt CO_2-Eq. (6%) of GHGE in Europe[8]. Understanding the social cost of diet-related GHGE is therefore critical for policy design, as higher food taxes would raise average annual EU household food spending by about €109, but recycling revenues through subsidies or transfers reduces net costs to around €26 per year, protecting vulnerable groups while incentivising lower-impact consumption[9]. Yet despite this evidence, food carbon pricing has gained limited traction, with equity concerns, particularly the risk of pricing low-income households out of nutritious diets, cited as a primary barrier to implementation[10].

Two structural gaps limit existing knowledge. First, existing research has not yet provided an integrated assessment of how internalising the social cost of diet-related GHGE would affect the affordability of the diets people actually consume[11,12]. Most studies examining diet costs and affordability focus on healthy or recommended dietary patterns benchmarked against normative dietary guidelines or reference food baskets[13], approaches that are informative for assessing nutritional adequacy but do not capture prevailing consumption patterns or the emissions embedded within current diets[14]. While prior work has begun to estimate

the global costs of sustainable dietary patterns and demonstrated that low-carbon diets can reduce ecological and health costs[15], these analyses rarely link environmental cost internalisation to food affordability outcomes across countries and population groups[16]. In parallel, studies have examined food-related environmental pricing scenarios, including carbon taxes and fiscal reforms, to assess impacts on consumption, emissions, and welfare[17,18]. However, existing estimates are commonly based on national averages, obscuring substantial heterogeneity by socio-demographic characteristics such as urban–rural residence, age, sex, or educational level[19]. Furthermore, current estimates of the carbon cost of diets remain limited in scope and resolution. Existing studies typically rely on global average Life Cycle Assessment (LCA) impact factors that overlook country-specific emissions footprints of production systems, trade structures, and agricultural practices[20].

Collectively, these gaps mean that the true affordability cost of dietary carbon pricing remains unquantified for the populations at most risk. Addressing these gaps requires an integrated framework that links dietary consumption, environmental footprints of food supply chains, and income distributions in a consistent and comparable manner across countries. As a point of departure, we quantify price effects of dietary carbon pricing based on country-specific food emission footprint modelling, current dietary patterns, and across socio-demographic groups. Here, we build on the MATILDA (Micro–Macro Assessment Tool to Identify Low-impact Dietary Actions) framework[21] and extend it to a cost-focused application, referred to here as MATILDA-Cost, to estimate both market and carbon-inclusive costs of current diets across 165 countries and multiple sociodemographic subgroups. MATILDA is a globally harmonised dietary impact model that integrates food consumption microdata from the Global Dietary Database (GDD) with supply-chain environmental footprints from the Food and Agriculture Biomass Input–Output (FABIO) model, bridging micro-level dietary intake data with macro-level food production and trade systems across diverse socio-demographic subgroups and countries worldwide.

MATILDA-Cost integrates harmonised dietary intake data with country-specific environmental footprint coefficients, food price information, and population income distributions. By jointly analysing current dietary patterns and supply-chain emissions, this study quantifies how incorporating environmental costs reshapes the economic burden of diets across countries and sociodemographic groups. The results identify population groups that may require complementary policies such as targeted subsidies, revenue recycling, or social protection to safeguard equitable access to diets during climate mitigation.

2. Methods and data

The MATILDA-Cost framework links harmonised dietary intake data with country-specific food prices, environmental footprint coefficients, and income distributions to assess how internalising diet-related greenhouse gas emissions reshapes dietary affordability across countries and sociodemographic groups. A schematic overview of the model framework is provided in Supplementary Fig. 1.

Dietary intake data and energy intake rescaling

Dietary intake data from the GDD are standardised to 2,000 kcal per person per day. To improve the accuracy of dietary cost estimates, we rescaled dietary intakes to country- and sociodemographic group-specific energy intake levels using anthropometry-based energy requirements estimated by Springmann (2025)[22], differentiated by age, sex and physical activity level. We combined the rescaled food group–specific dietary energy intakes with corresponding food group prices derived from the HDB. Dietary costs were calculated for each country and sociodemographic subgroup (i.e., age, sex, or educational level, and urban–rural residence) included in the GDD.

Estimation of dietary cost

Dietary costs were estimated by integrating food group–specific price information from the World Bank Food Prices for Nutrition Data Hub[23] with dietary intake data from the GDD[24]. We obtained country-specific cost estimates for the six food groups defined in the Healthy Diet Basket (HDB)[25]: starchy staples; animal-source foods; legumes, nuts and seeds; vegetables; fruits; and oils and fats (Supplementary Table 1). The HDB has been validated as a global dietary standard that is not only nutritionally adequate but also associated with relatively lower environmental impacts compared with current consumption patterns[26]. These data report the minimum cost of acquiring the least expensive locally available foods required to meet dietary energy and HDB requirements, expressed in purchasing power parity (PPP) dollars per person per day at 2,330 kcal.

Food group costs were converted to per-unit prices (PPP dollars per kcal) by dividing reported daily costs by the caloric quantities assigned to each food group in the HDB, yielding harmonised, country-specific unit prices. All cost data are expressed in international dollars at 2017 PPP prices and were converted to 2018 values using World Bank PPP conversion factors to align with the GDD reference year.

Social cost of diet-related GHGE

Estimating the social cost of carbon (SCC), the monetised damage caused by one additional tonne of CO_2 emissions, is central to environmental cost internalisation. Published SCC estimates vary widely depending on discount rate, damage function, and socioeconomic scenario. We adopt the social cost of diet-related GHGE estimates reported by Rennert et al. (2022), based on an ensemble of models, which provide a mean value of \$185 ton/CO_2 (5th–95th percentile range: \$44–413 ton/ CO_2, in 2020 United States Dollar, USD)[27]. This corresponds to \$0.185 kg/CO_2. To ensure consistency with the dietary cost calculations, we adjust these estimates for inflation and PPP to express them in 2018 PPP USD, resulting in social cost of diet-related GHGE of \$0.143 kg/CO_2 and an uncertainty range of \$0.034–0.320 kg/ CO_2. These adjusted values are then applied to compute the social costs of dietary GHGE for each demographic subgroup within the GDD, based on country- and product-specific GHG estimates in MATILDA.

Income and population distribution data

Income and population distribution data were obtained from the Poverty and Inequality Platform (PIP) of the World Bank[28], which reports per-capita consumption or income aggregates and corresponding population shares across 100 income bins at 1% increments for each country. These aggregates are based on either consumption expenditure or income, depending on data availability in each country. Where both measures were available, income-based aggregates were prioritised, as they directly capture monetary receipts. In our analysis, 64 countries used income-based aggregates, predominantly high-income countries, while 82 countries used consumption expenditure, predominantly low- and middle-income countries. For each country, we selected the observation closest to the reference year 2018. Income levels were scaled to 2018 values using country-specific annual real GDP per capita growth rates.

Dietary affordability assessment

Country-level dietary cost estimates were derived from harmonised food price and consumption data, yielding two minimum dietary cost thresholds for each country: (i) food-only dietary cost and (ii) a full-price dietary cost, which incorporates the monetised social cost of diet-related GHGE. Country-level dietary cost thresholds were aggregated to the regional and global levels by taking unweighted means across countries within each region.

Within each country, population-weighted income distributions were constructed by ordering income bins in ascending order of per-capita income and calculating cumulative population shares. Regional- and global-level affordability analysis were also conducted by pooling all country-level income bins within the same region and deriving cumulative distribution functions (CDFs) of income, weighted by their respective population sizes.

Dietary affordability was assessed by comparing per-capita income with country-specific dietary cost estimates. A diet is considered unaffordable when its cost exceeds the share of income available for food expenditure. Following Smith and Subandoro (2007)[29], country-specific food expenditure shares were assigned based on the World Bank's income group classification: Low-income = 0.75; Lower-middle-income = 0.70; Upper-middle-income = 0.575; High-income = 0.50. These shares represent the proportion of household income that can reasonably be reserved for food, after accounting for essential non-food expenditures such as housing, transport, education, health and farm inputs[30]. For each income bin, individuals were classified as unable to afford a given dietary scenario if their effective food budget, defined as the per-capita income multiplied by the corresponding food expenditure share, fell below the national average dietary cost estimate.

Dietary cost estimates were calculated at the group level, accounting for differences in dietary composition across socio-demographic subgroups. However, due to the lack of income distribution data disaggregated by socio-demographic characteristics, the affordability analysis was conducted using average national dietary costs for each scenario. For each region and for the global population, the share of the population unable to afford the food-only dietary cost, the share unable to afford the full-price dietary

cost was calculated, revealing the additional population rendered unable to afford a healthy diet once external costs are internalised to national food costs.

3. Results

Accounting for the social cost of diet-related GHGE increases the absolute cost of maintaining current average diets globally by a median of 15.5% (IQR 11.3%–22.0%), with substantial cross-country heterogeneity, as country-level increases range from 4.8% to 62.6%. Across 165 countries, the estimated food-only dietary cost (2018 PPP, per capita per day) ranged from $1.58 to $12.19, with a median of $4.20 (IQR $3.48–$5.43). The social cost of diet-related GHGE ranged from $0.20 to $3.03 per person per day, with a median of $0.70 (IQR $0.50–$0.98). Countries with the highest food-only dietary costs included Croatia ($12.19/day), Uzbekistan ($11.80/day), and Bosnia and Herzegovina ($11.46/day), whereas the lowest costs were observed in Guinea ($1.58/day), Senegal ($1.62/day), and Gambia ($1.75/day).

Regional heterogeneity in the relative contribution of GHGE costs to total dietary costs was also pronounced. The median relative contribution of the social cost of diet-related GHGE to dietary costs was highest in South America (+33.0%) and Middle Africa (+27.4%), followed by Eastern Africa (+23.6%) and Western Africa (+22.6%). In contrast, relative increases were lowest in Northern America (+8.8%), Eastern Europe (+8.8%), and Western Europe (+9.5%).

Substantial regional heterogeneity was observed in both the level and composition of dietary costs, as well as in the contribution of the social cost of diet-related GHGE (Figure 2). The highest median full-priced dietary costs were observed in Polynesia ($6.43/person/day), followed by Central Asia ($5.96) and Oceania ($5.91), whereas the lowest full-priced dietary cost was found in Western Africa ($3.02) and Melanesia ($3.13) (Figure 2). Cost composition also differed markedly across regions. Animal-source foods accounted for a high fraction of full-priced dietary costs in Northern Europe (62.3%), Eastern Europe (61.3%), and Western Europe (58.5%), whereas plant-based items dominated in Polynesia, where fruits, vegetables, legumes, and nuts/seeds together represented 72.0% of food-only costs. Dairy products accounted for the largest share of full-priced dietary costs in more than half of the regions, contributing most to Northern Europe (41.9%) and Oceania (38.3%). The relative contribution of the social cost of diet-related GHGE to full-price dietary costs varied substantially (median 14.7%, IQR 10.6–19.2%; range 8.4–26.4%). The largest shares were observed in South America (26.4%), Middle Africa (21.3%), and Central America (19.8%). In contrast, the social cost share was lowest in Eastern Europe (8.7%) and Northern America (8.4%).

Dietary costs exhibited marked differences between socio-demographic groups and based on plant-based dietary food share (Figure 3). Using full-price dietary cost as an example, within the same decile of plant-based dietary share, urban populations consistently incurred higher dietary costs than rural populations, with a mean difference of $0.70 per day. Higher educational level was associated with higher dietary costs across most deciles, particularly in urban settings, with differences of approximately $0.69 to $1.71 per day between high- and low-education groups. Sex-related differences in dietary costs ranged from approximately $0.55 to $1.70 per day across regions, with males generally exhibiting higher costs than females. Age-related differences in dietary costs ranged from approximately $0.25 to $1.25 per day across regions, with younger adults (15–34 years) generally exhibiting higher costs than older adults (55+ years), particularly in lower plant-based deciles. Both food-only and full-price dietary costs displayed a clear declining trend across deciles of plant-based food proportion. For full-price dietary costs, the median cost across all population subgroups decreased from approximately $5.6 per day in the lowest plant-based decile to $3.3 per day in the highest decile (PPP, 2018).

Including environmental costs further increases existing regional inequalities in dietary affordability. Globally, we estimate 3.61 billion people (51%) are unable to afford the food-only dietary cost (i.e. current cost) of the national average diet (Figure 4). Once the social cost of GHGE is added, 4.01 billion people (57% of the global population), an increase of approximately 397 million people, are unable to afford their diet. Marked regional disparities were observed. In sub-Saharan Africa (Eastern, Middle, Southern, and Western Africa), unaffordability levels were the highest globally, with a mean of 75.9% of the population unable to afford the food-only dietary cost of the national average diet. In Eastern Africa, 87% (311 million) of the population could not afford the food-only dietary cost, increasing to 91% (325 million) under a full-priced diet. Similarly, in Middle Africa, unaffordability rose from 82% (160 million) for food-only costs to 87% (171 million) for the full-price dietary cost, while in Western Africa, the corresponding shares increased from 71% (266 million) to 79% (298 million). By contrast, unaffordability remained comparatively low in high-income

regions. In Western Europe, only 1% (1.9 million) of the population could not afford the full-price dietary cost, while in Northern America, the corresponding share was 3% (9.8 million) (Supplementary Table 2).

4. Discussion

This study provides a global, demographically resolved assessment of how internalising the social cost of diet-related greenhouse gas emissions reshapes the economic burden of current diets. While carbon pricing is widely discussed as a cost-effective climate policy, its application to food systems remains contested due to concerns over affordability, equity, and the essential nature of food consumption[31]. By integrating dietary intake data, region-specific environmental footprints, and income distributions within a harmonised modelling framework, we identify three key findings. First, internalising GHGE costs increases the cost of diets in all regions, with a median relative increase of 15.5% across 165 countries, but with marked cross-country variability. Second, these increases translate into substantial affordability consequences. Globally, the share of people unable to afford diets rises from 51% under food-only costs to 57% under total costs, corresponding to approximately 397 million additional people falling into unaffordability (exceeding the population size of the United States). Third, the distributional burden is highly uneven: the largest absolute and relative affordability impacts are concentrated in low-income regions, particularly sub-Saharan Africa and South Asia, while high-income regions tend to exhibit comparatively low unaffordability despite higher per-capita environmental costs, reflecting a better capacity to absorb increased dietary prices.

Our findings further show that an estimated 397 million additional people globally become unable to afford current diets once environmental costs are internalised. These regressive impacts reflect the interaction between two structural asymmetries. First, food systems in low-income regions tend to be more emissions-intensive per unit of dietary energy, owing to lower agricultural efficiency, higher reliance on extensive livestock production, and greater land-use change emissions embedded in supply chains. Second, baseline dietary costs already absorb a large share of household income in these regions, leaving limited capacity to absorb additional carbon-related cost increases. These dynamics differ markedly from high-income regions, where more efficient supply chains keep per-unit carbon costs lower as a share of diet cost, and where higher incomes buffer any residual impact. These findings are consistent with Springmann et al. (2021), who show that the global costs of healthy and sustainable diets are highest in low-income countries relative to per-capita income, and with Lucas et al. (2023), who demonstrate that low-carbon diets could reduce both health and ecological costs but require structural changes to food supply chains that are currently most constrained in low- and middle-income settings[20,32].

Our findings are consistent with previous research showing that carbon pricing and environmental cost internalisation are often regressive without redistribution, especially in low-income settings[33]. For example, distributional analyses of carbon pricing in the European Union show that, at the aggregate level, carbon taxes can have regressive effects because lower-income countries face a relatively higher burden than high-income countries[34]. Consistent patterns have also been documented at the household level, where lower-income households experience larger welfare losses in the absence of targeted transfers[35].

4.1 Policy recommendation

Several policy instruments are available to mitigate the unequal impacts that arise from full-pricing of diets to support a sustainable dietary transition. Recycling revenues from environmental pricing offers a direct way to offset affordability losses. Based on the carbon price applied in this study ($0.143 per kg CO_2), the social cost of diet-related GHGE across the 165 countries studied could generate approximately $2.25–$2.36 billion (2018 PPP) annually. While modest in global terms, these costs represent a meaningful share of national income in low- and middle-income countries: the social cost of diet-related GHGE amounts to 49.5% of GDP in the Central African Republic, 14.2% in Mozambique, and 13.5% in Yemen (Supplementary Table 3). This finding aligns with previous evidence that carbon pricing can generate around 10–12% of total government revenue from carbon taxes alone and over 20% when combined with fossil fuel subsidy removal[36].

When recycled through cash transfers, these revenues can raise average household incomes by around 3%, thereby partially compensating for affordability losses[36]. Targeting equal per-capita revenue redistribution in our framework to populations unable to afford diets reduces global dietary unaffordability from 51% to 48%, with the largest improvements observed in Western Africa, where the share falls from 71% to 62% (Supplementary Fig. 2). Such targeted transfers or equal per-capita refunds (i.e. lump-sum refunds distributed equally across the population)[37] can substantially reduce regressive effects. For example, analyses covering 16

Latin American and Caribbean countries representing more than 540 million people show that recycling carbon pricing revenues through cash transfers can fully offset cost increases for low-income households[38], while EU-wide simulations indicate that a consumption-based carbon tax generating around €200 billion annually would raise costs for the lowest-income groups by up to 6–9% in the absence of compensation but can completely neutralise inequality impacts when revenues are redistributed as lump-sum transfers[39]. Similar approaches could be applied to food systems through existing social protection[40] or food assistance programmes[41]. Targeted food subsidies provide a complementary tool. Empirical evidence shows that subsidising nutrient-rich foods by 10–25% increases fruit and vegetable intake by approximately 0.4–0.6 servings per day, and that a 20% price reduction leads to a 16–17% increase in purchases[42]. When combined with pricing of high-emission foods, such subsidies can promote healthier diets while cushioning affordability impacts[43], provided that lower-impact alternatives are readily available in domestic markets to avoid exacerbating national or household food insecurity.

Policy needs also differ by income level. In high-income countries, environmental pricing may encourage shifts towards lower-impact diets with limited affordability consequences, as aligning diets in such countries with national dietary guidelines has been shown to reduce diet-related GHGE by around 20–50% without compromising nutritional adequacy or affordability[44]. By contrast, in low-income regions, protecting access to nutritious diets requires safeguards that prevent environmental costs from being passed on to consumers. Evidence shows that in food systems at earlier stages of transition, a nutritious diet remains unaffordable for a large share of the population, with only around 15% of people able to afford recommended diets in rural and informal systems[45]. In these contexts, policy measures such as exemptions for staple foods, gradual phase-in of pricing, or compensatory transfers are essential[46].

4.2 Strengths and limitations

This study has several key strengths. First, it provides the first global, harmonised assessment of the true cost of current diets by jointly integrating food prices, dietary intake, greenhouse gas footprints, and income distributions across 165 countries. Second, MATILDA captures socio-demographic heterogeneity, revealing distributional impacts hidden in national averages and informing equity-focused policy design. Third, dietary GHGE estimates are linked to country-specific production systems and trade structures, improving consistency between consumption-based footprints and economic valuation.

This study has several limitations that should be acknowledged. First, while we estimate the full-priced cost of diets by internalising the social cost of diet-related GHGE, we do not model behavioural responses to higher food prices. As a result, our analysis does not capture potential changes in consumption patterns, substitution effects, or feedbacks along the food supply chain[47] that could arise under carbon-inclusive pricing. Consequently, the estimated emissions reductions associated with full pricing remain uncertain. Future work could integrate price elasticities of demand or diet optimisation frameworks to assess how consumers might adjust food choices in response to carbon-inclusive food prices[48], and to quantify the resulting environmental and health outcomes.

Second, dietary cost estimates rely on World Bank food price data, which reflect the lowest-cost items within each food group. While this approach ensures global comparability, it may underestimate actual food expenditures faced by consumers, particularly in settings with limited market access, high price dispersion, or strong preferences for branded or processed foods[49]. Incorporating more detailed retail price data or household expenditure surveys would improve the representation of real-world food purchasing conditions[50].

Third, the social cost of diet-related GHGE is derived from global estimates of the social cost of carbon and applies a uniform carbon price across countries and food groups. This approach does not capture potential regional heterogeneity in climate damages, differences in vulnerability to climate impacts, or local environmental externalities[51], such as biodiversity loss, water pollution, or land degradation. Future research could explore region-specific carbon cost estimates or multi-dimensional environmental pricing schemes that better reflect local environmental risks.

Finally, although dietary costs are estimated at the socio-demographic group level, affordability is assessed using national income distributions applied to average national diets, due to the lack of income data disaggregated by socio-demographic characteristics. As a result, the affordability analysis captures cross-country and regional differences in income distributions but does not reflect within-country variation in affordability across population subgroups. Future research should therefore prioritise improved data

linking income, food prices, and dietary patterns at the subgroup level, and model behavioural responses to carbon-inclusive food prices.

5. Conclusion

This study provides evidence that carbon pricing applied to food systems carries profound distributional consequences, disproportionately burdening populations in low-income regions who bear the least responsibility for global emissions. Our analysis shows that without deliberate redistribution mechanisms, including targeted transfers, food subsidies, and social protection calibrated to local income and dietary conditions, pricing dietary GHGE risks deepening the nutritional inequities it ostensibly seeks to resolve. The revenues generated by such pricing represent a meaningful and underutilised policy resource. Realising the dual goals of food system decarbonisation and equitable nutrition access will require embedding environmental pricing within broader social protection frameworks, particularly in low- and middle-income country contexts.

Declarations

CRediT authorship contribution statement

Hongyi Cai: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Formal analysis, Data curation. **Oliver Taherzadeh:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

The data underlying this article are derived from multiple publicly available sources. Dietary intake data were obtained from the Global Dietary Database (GDD; https://globaldietarydatabase.org/). Food price data were sourced from the World Bank Food Prices for Nutrition Data Hub (Healthy Diet Basket; https://www.worldbank.org/en/programs/icp/brief/foodpricesfornutrition). Environmental footprint coefficients were drawn from the Food and Agriculture Biomass Input–Output (FABIO) model (https://doi.org/10.5281/zenodo.2577067). Income and population distribution data were obtained from the World Bank Poverty and Inequality Platform (PIP; https://pip.worldbank.org/). The MATILDA-Cost model code used in this study will be made available on request.

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Figures

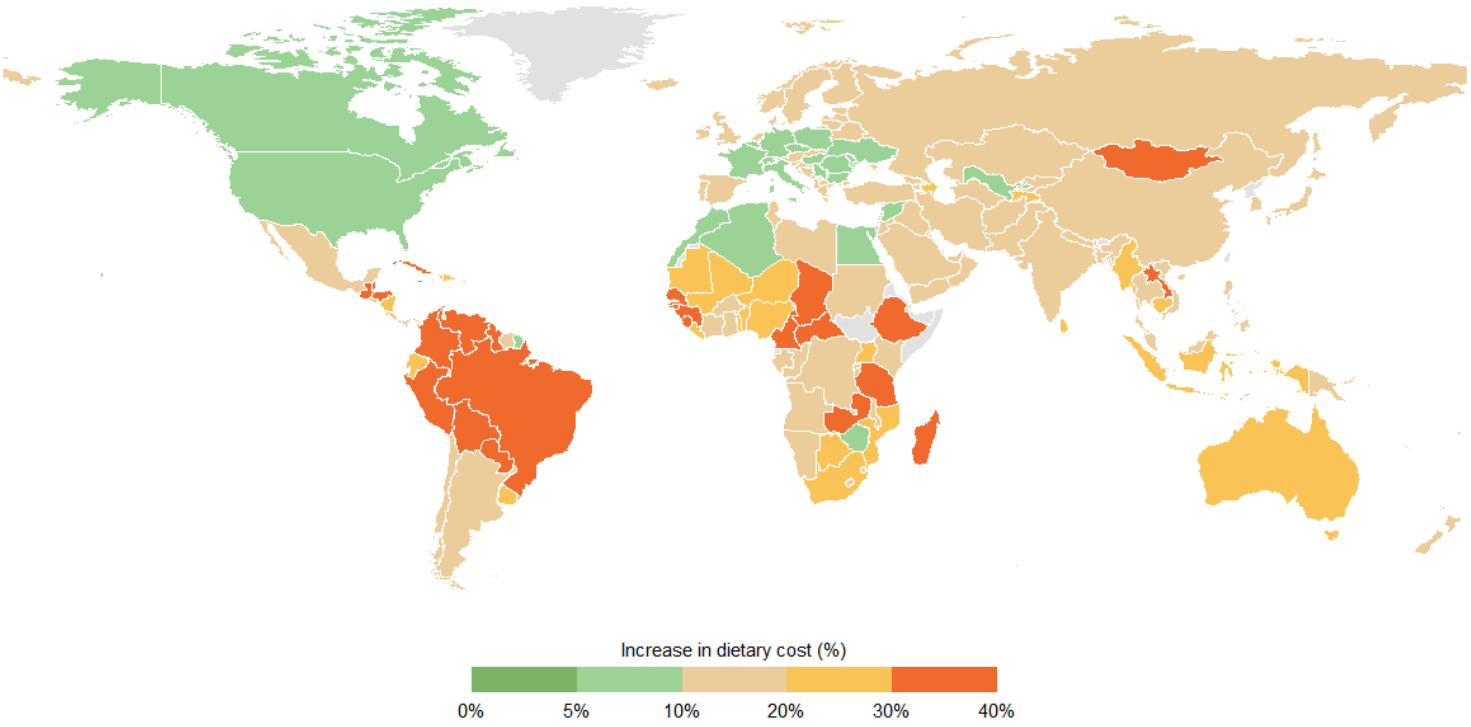


Figure 1

Relative increase in dietary costs after accounting for the social cost of diet-related GHGE

Country-level estimates are expressed as percentage changes compared with baseline food-only costs. Countries with missing data are shown in grey.

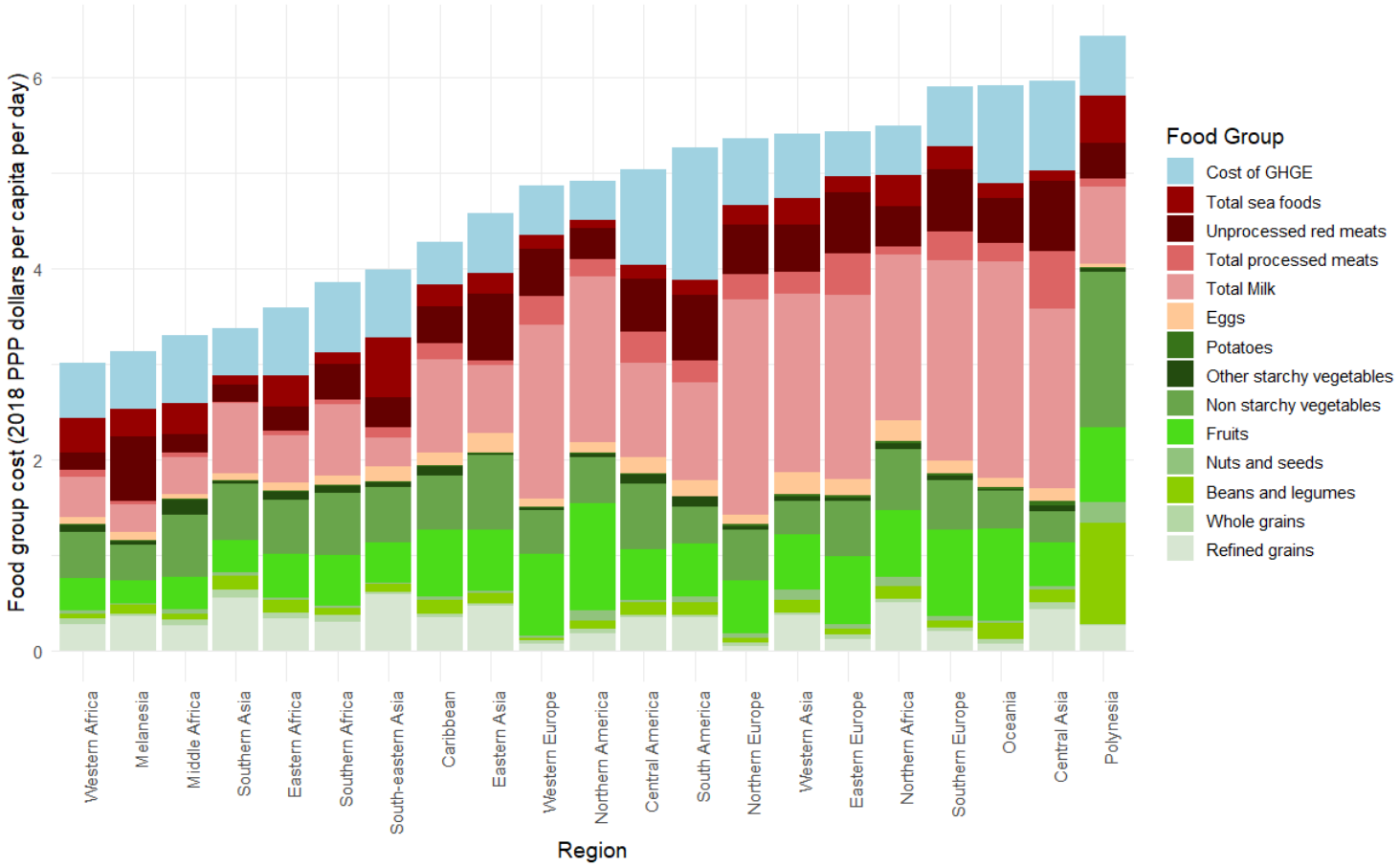


Figure 2

Regional composition of dietary costs and the social cost of diet-related GHGE

Stacked bars show the per-capita daily dietary cost by food group across regions in 2018 PPP $. Food-group components represent food-only dietary costs, while the blue bar segment indicates the social cost of diet-related GHGE.

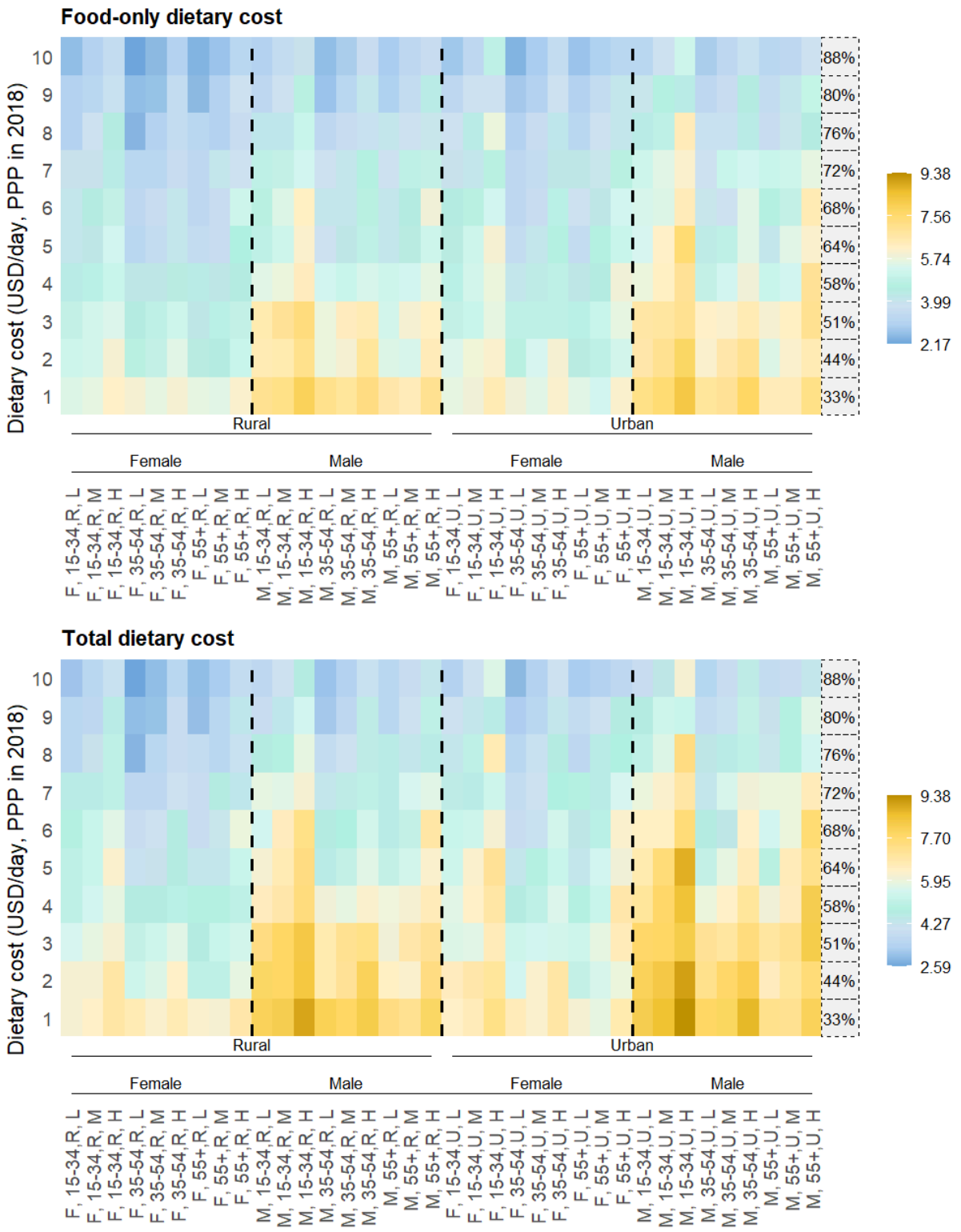


Figure 3

Dietary cost gradients across deciles of plant-based dietary composition

Food-only and full-price dietary costs across deciles of plant-based food proportion by socio-demographic subgroup. The left y-axis shows deciles of plant-based food proportion, with 1 indicating the lowest and 10 indicating the highest proportion of plant-based foods. Colours represent dietary cost (USD/day, PPP, 2018). Percentages shown on the right-hand side indicate the corresponding plant-based food proportion for each decile. Population subgroups are defined by sex, age, urban–rural residence, and educational attainment.

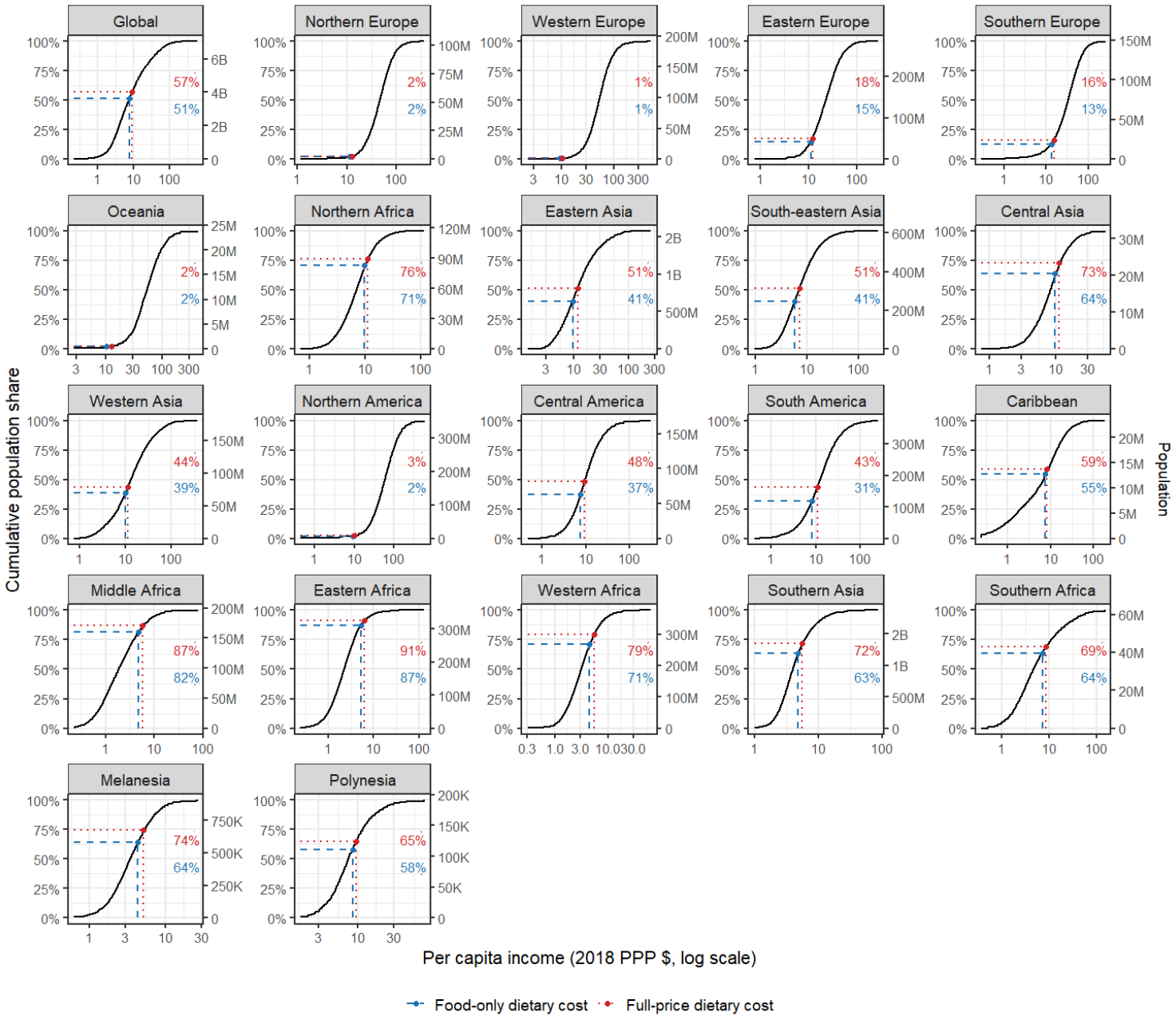


Figure 4

Regional affordability of food-only and full-price dietary costs across income distributions

Curves represent cumulative distribution functions of population income for each region. Vertical dashed and dotted lines indicate the thresholds for food-only dietary cost and full-price dietary cost, respectively, while their intersections with the income cumulative distribution functions *(CDFs) denote the population share unable to afford each dietary cost.*

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

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