The Effects of Inequality on the Triple Burden of Malnutrition

– Are there Synergies or Trade-offs?

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Abstract

While there is a consensus on the potential for a trade-off between the political targets of reducing economic inequality and environmental deterioration, little research acknowledges that nutritional quality may affect this trade-off. Especially in contexts in which animal protein plays an important role for either providing micronutrients and calories or lead to over nutrition, the interacting effects with income inequality levels are unclear. The study at hand provides empirical evidence on how inequality reduction affects both, the triple burden of malnutrition and the ecological footprint (EF) stemming from beef production.

A Group Fixed Effects model provides empirical results which are illustrated by displaying the joint impacts of income inequality and average income on agricultural activities and nutritional outcomes as three-dimensional surface plots, allowing for observing the interacting impacts of income levels and income inequality. We find that decreasing inequality leads to a reduction of both under nutrition and lack of micronutrient diversity. Overweight increases with decreasing inequality in low-income countries while the opposite is true in high income countries. The results further suggest that in low- and middle-income countries, a decrease of inequality would, *ceteris paribus*, lead to a decrease in a country's aggregate EF from beef consumption while the opposite effect is observed in high income countries.

Keywords

Income inequality, nutrition, triple burden of malnutrition, Group Fixed Effects.

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1 Introduction

The results published by the EAT Lancet commission on the health and environmental effects of diets around the world (WILLETT ET AL., 2019) generated wide interest in academia and the public discussion alike. While WILLETT ET AL. (2019) focus on the individual perspective when suggesting an optimal diet in line with health and environmental objectives, the concept of the Doughnut Economics, suggested by RAWORTH (2017), addresses societies at large. The study of RAWORTH (2017) attempts to develop a corridor within which societies could develop to ensure human wellbeing within planetary boundaries. One component of that wellbeing is the reduction of stark economic (income) inequality.

While the policies implemented by many countries to reduce income inequality (CRUDU, 2015; MISHRA ET AL., 2009; KELLER, 2010) and improve nutrition outcomes (DIFILIPPO ET AL., 2015; JENSEN AND MILLER, 2011; MISHRA AND RETHERFORD, 2000) were often successful in meeting their objectives, their evaluations do not necessarily take into account whether such measures remain within planetary boundaries (MISHRA ET AL., 2009; KELLER, 2010; MISHRA AND RETHERFORD, 2000). Especially increases in meat consumption can be the result of decreasing income inequality (HAMANN ET AL., 2018; CHAN AND ZLATEVSKA, 2019). However, while such an increase in meat consumption can play a key role in improving dietary diversity in low-income countries (OCHIENG ET AL., 2017), it is also associated with negative environmental externalities (DIETZ, 2020; MICHAELOWA AND DRANSFELD, 2008). In consequence, there might be a trade-off between reducing income inequality and improving nutritional quality on the one hand and remaining within planetary boundaries on the other. At the same time, the more pressing problem in higher income countries regarding malnutrition is the over consumption of a range of food stuffs, including processed meat (LINDE ET AL., 2006), causing the proliferation of obesity and cardiovascular diseases (MICHAELOWA AND DRANSFELD, 2008). in addition to the environmental consequences of meat production. In high income countries, a decreasing trend in meat consumption would therefore be unambiguously desirable, both from a public health and from an environmental perspective.

The study at hand focuses on the effect of economic inequality. A substantial body of literature already discusses the consequences of income inequality on the environment. Most of those studies focus on the effects on greenhouse gas emissions (GRUNEWALD ET AL., 2017), and recently KOPP AND NABERNEGG (2022) extend in their paper the existing analyses by several additional measures of environmental deterioration. Our objective is to quantify how a decrease in income inequality affects nutritional outcomes (in terms of reducing under nutrition, over nutrition, and micronutrient deficiency), and environmental degradation. We explicitly allow for this effect to vary depending on countries' income levels, given that the mechanisms that moderate the relation between income inequality, meat consumption, and environmental degradation, depend on the respective society's wealth.

To the best of our knowledge, this study is the first to quantitatively explore the effect of reduced levels of inequality on nutrition and environmental indicators. The empirical analysis applies a Group-Fixed-Effects (GFE) estimation, to address the problem of the usually assumed constancy of fixed effects in panel data estimations. The robustness of the results to the choice of the econometric procedure is tested by carrying out all estimations also with the Two-Step System-General Method of Moments estimator (not included in this shortened version of the paper).

Results are illustrated by a recently suggested, graphical representation (KOPP AND NABERNEGG, 2022), which displays the combined effects of income inequality and average income on food consumption and environmental use in the form of surface plots, allowing for observing the interactions of income levels and income inequality. They suggest that decreasing inequality has unambiguously beneficial consequences in terms of calorie intake and the provision with micronutrients. Regarding overweight, the results are more nuanced: In low-income countries, a decrease in inequality increases overweight, while the opposite is true for high income countries. For middle income countries, the effects depend on the initial level of inequality. The results further suggest that in low- and middle-income countries, a decrease of a country's inequality level leads, *ceteris paribus*, to a decrease in its aggregate beef consumption while the opposite effect is observed in high income countries.

2 Interactions between malnutrition, inequality, and environmental degradation

This section provides background information on the triple burden of malnutrition and the problems caused by income inequality, and on how the two issues interact. We then move on to lay out how the joint improvement of the two can cause new challenges in a third dimension, the natural environment.

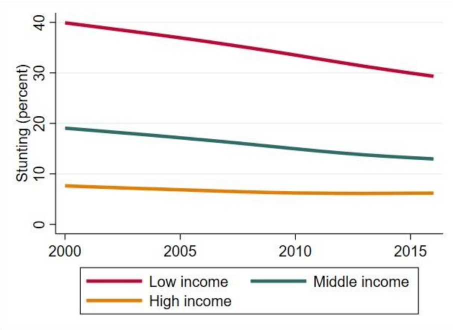
The nutritional situation in the world has changed substantially over the last 20 years. Under nutrition and micronutrient deficiency, i.e., the lack of a balanced diet, have both decreased during the last decades (see Figures 1a and 1b). However, the respective gaps between high-, middle-, and low-income countries are still large. Further, the recent years have witnessed the increase of over nutrition, up to obesity, especially in high income countries (see Figure 1c). Again, abstracting from the respective trends, the differences in the *levels* of overweight are a reason for concern, with high overweight rates being particularly a reason for concern in high-and middle-income countries. Further, the current stagnation in low-income countries might be in fact a trend change from decreasing to increasing levels (at still a relatively low level, though). The combination of two or three of those issues are referred to as double or triple burden of malnutrition, respectively (MEENAKSHI, 2016; GOMEZ´ ET AL., 2013).

Income inequality can act as a substantial detriment to economic and societal development because it is associated with low political stability (ROE AND SIEGEL, 2011), poverty traps (BERGEIJK AND HOEVEN, 2017), and reduced economic growth (GRAHAM, 2017). In the last 60 years, income inequality has undergone profound changes. Figure 1d illustrates that inequality rates are much higher in low- and middle-income countries compared to high income countries, making the reduction of inequality a prime policy target especially in those contexts. Figure 1d also shows that inequality has increased between the late 1980s and 2010 in the high-income countries before the trend reversed and inequality decreased again. The same general picture can be observed for low and middle income countries, with only the moment of the trend change being earlier: In low income countries, the trend reversed in the middle of the 2000s, while the same happened in the middle income countries already in the 1990s. A strand in the literature on inequality takes a closer look at the development of those rates over time to allow for the analysis of determinants of income inequality. The literature has identified several key determinants of income inequality, including financial liberalization (ZEHRI AND ABID, 2019; HAAN ET AL., 2018), as well as the demographic composition, unemployment, international trade, and economic development (FURCERI AND OSTRY, 2019).

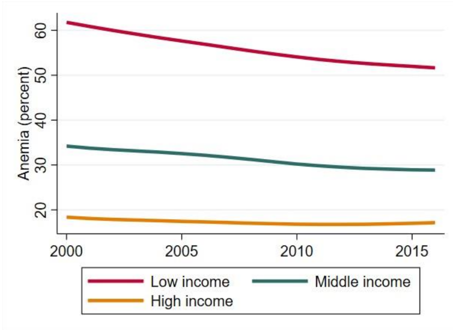
There is some empirical research on the relation between income inequality and nutrition at the micro scale. HONG ET AL. (2006) explore the effect of inequality on nutrition in Bangladesh, finding that wealth inequality has a strong, negative effect on child development. Their study concludes that not only a decrease in inequality levels (through wealth increases of the poorest) but also health services directed at this group would be required to improve child health. One shortcoming of this study is its focus on wealth inequality, an indicator that is more difficult for policy makers to address than income inequality (SCHEUER AND SLEMROD, 2021). Further, their study does strictly speaking not analyse the direct consequences of inequality but rather the nutritional status of different income strata. A similar methodological approach is employed by ZHENG AND HENNEBERRY (2011), who analyse demand for food products in China, finding that the food demand of members of different social classes reacts differently to price and income changes, i.e., that demand elasticities depend on income. Their results suggest that reductions of inequality would lead to demand increases for foods with animal origin because the poor react stronger to price changes in those products. CHEN AND MELTZER (2008) find for China that increasing inequality levels are associated with higher obesity rates, which the authors explain to be caused by changing social norms, being created by the economically successful individuals' increasing body weight and trickling down to lower income groups, an effect labelled "expenditure cascades" and observed by FRANK ET AL. (2010) in other contexts. DOGBE (2021) finds for over nutrition in Ghana that the affluent are becoming more obese, coinciding with a widening of the income gap.

Figure 1: Development of measures of nutrition and inequality in country groups

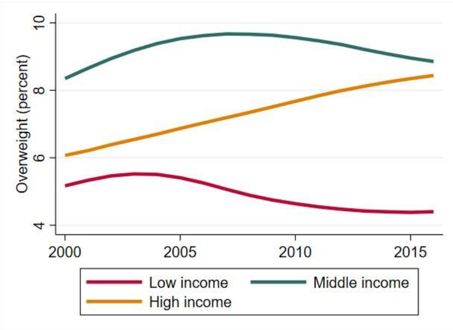
(a) Development of stunting



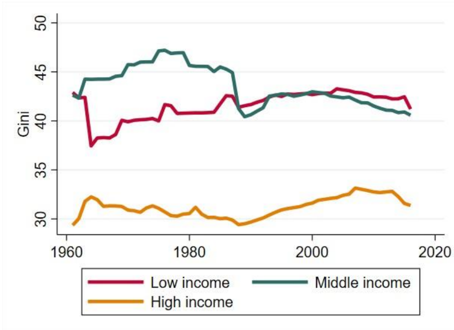
(b) Development of anaemia



(c) Development of overweight



(d) Development of income inequality



Source: Own production, based on data from UNICEF, WHO, World Bank, and WHO Global Health Observatory Data Repository/World Health Statistics for child malnutrition and the Standardized World Income Inequality Database for income inequality.

Notes: (a): Modelled estimates of prevalence of stunting (height for age, % of children under 5), (b): Prevalence of anaemia among children (% of children ages 6-59 months), (c): Modelled estimates of prevalence of overweight (% of children under 5), and (d): Estimated levels of *GINI* index of income inequality.

The income groups were defined based on the same data that enter our estimations (see section 3.3). Countries were divided at percentile 33 and 66 for the average *GDP p.c.* from years 1961-2016, with low-income countries having a *GDP p.c.* of less than 2,192 USD, middle income countries ranging between 2,193 USD and 9,014 USD, and high-income countries being above 9,015 USD.

Research has also provided insights that policies to decrease inequality can have the potential to cause detrimental effects on the natural environment. Several theoretical considerations also suggest possible negative environmental effects of achieving the political targets of reducing inequality and improving nutrition. HEERINK ET AL. (2001) show how important income distribution is for explaining the environmental damage caused by households. Their study offers theoretical and empirical results that suggest a conflict of policy objectives between reducing income equality and environmental protection. KOPP AND NABERNEGG (2022) investigate the consequences of inequality on several indicators of environmental degradation, yielding diverse results. CHANCEL (2022) studies distributions of income and carbon footprints within and between countries and estimates that the wealthiest 10% of the world population were responsible for 48% of total carbon emissions in 2019, while the lower 50% of the population only emitted 12%. More importantly, the study finds that what drives this difference in carbon footprints has changed from being the economic inequality between countries to the economic inequality within countries. This implies a negative relationship between the levels of income inequality and environmental conservation, as well as greenhouse gas emissions. For middle income countries, the relationship is also negative (JORGENSON ET AL., 2016), while for high income countries, the relationship moves from negative to positive and in recent years the emissions from these countries have worsened.

The explanations for the effects of inequality on environmental indicators through meat consumption can be categorized in several groups. The household-based explanations operate mainly through private consumption behaviour. For example, a concave household consumption effect (SEXTON AND SEXTON, 2014; BAUMGÄRTNER ET AL., 2017), i.e., decreasing marginal propensities to consume with increasing incomes, results in an increase of environmental impact when decreasing inequality levels, *ceteris paribus* (*c.p.*). Opposing explanations are collective action dynamics in the management of common goods (JORGENSON ET AL., 2016) or conspicuous consumption (FRIEHE AND MECHTEL, 2014). These channels predict synergies between reducing inequality and environmental impact. For example, individuals may use beef consumption as an indicator of higher socioeconomic status (HAMANN ET AL., 2018). As a response, lower income groups potentially follow the lifestyle of the rich, an observation that can be explained by the theory of *social compensation* which asserts that individuals who belong to the low socioeconomic status show a great preference for meat to make up for their lack of status (CHAN AND ZLATEVSKA, 2019). In fact, they showed a greater preference for meat than individuals who already felt they had a high socioeconomic status (CHAN AND ZLATEVSKA, 2019). For a whole country, this means that the conspicuous consumption of meat could lead to a decrease of beef in the diet when inequality decreases.

3 Empirical analysis

3.1 Methodology

A Group-Fixed-Effects estimation procedure (GFE, BONHOMME AND MANRESA, 2015), controlling for time-varying, unobserved heterogeneity, is applied to unbalanced panel data, including 117 countries over 56 years, to estimate the effect of income inequality (measured by the *Gini* coefficient) on a country's average consumption of beef, as well as respective indicators of the triple burden of malnutrition.

The estimation is conducted for four dependent variables: First is one sub indicator of the Ecological Footprint (EF), the grazing land footprint[1]. The EF measures a country's aggregate consumption, calculated as the sum of the footprints of a countries' entire production, adding (subtracting) environmental impacts embodied in imports (exports) (LIN ET AL., 2019). Three dimensions of malnutrition are measured by stunting (as an indicator for under nutrition), anaemia (micronutrient deficiency) and overweight (over nutrition). The regression model also controls for mean incomes, the composition of the economy, and the ratio between the rural and urban populations[2]. We interact the measures for inequality with *GDP per capita* to allow for diverse consequences of inequality, depending on the income of the country under consideration. The variable of interest, the *Gini* index, enters three variables on the RHS of the estimation: *Gini, Gini²*, and the interaction term *Gini*GDP p.c*. As this makes the interpretation difficult, we employ an improved version of the graphical approach suggested by KOPP AND NABERNEGG (2022) to illustrate the results more intuitively.

3.2 Estimation procedure

The purpose of the GFE is to control for time-varying, unobserved heterogeneity in panel data sets with one observation per country and year. This control of time-varying unobserved differences cannot be applied in approaches with country fixed or random effects. If such models included country-specific year fixed effects, one would run out of degrees of freedom because there would be as many fixed effects as there are observations. Other approaches identifying unobserved heterogeneity in panels (BESTER AND HANSEN, 2016; LIN AND NG, 2012) have not considered time-varying effects. The GFE addresses this problem by identifying groups of countries that follow similar patterns in the observed variables over time and interacting the resulting group dummies with time fixed effects (BONHOMME AND MANRESA,

[1] About 93\% of the world's grazing land is dedicated to cattle raising (KOPP AND NABERNEGG, 2022).

[2] The latter are included because there is some evidence that the rural-urban divide is a key determinant of inequality: SENGUL AND TUCER (2005) find that inequality is larger in rural than in urban areas (Turkey) and DOGBE (2021) finds a significant urban-rural divide in terms of inequality (and obesity) for Ghana.

2015). The advantage of the GFE approach is that the problem of small, intertemporal variation in the Gini coefficient compared to the cross-country variation is well addressed. The assignment of countries to the groups is done in an iterative process of two alternating steps after an initial seed of random assignments. Then the Euclidean distances between each country's vector of observed characteristics and the mean of its currently assigned group is calculated. The update step then re-assigns the countries to groups with lower Euclidean distances. The iterations are repeated until the assignments converge, i.e., no more changes occur in two subsequent steps. Assuming that those countries are also similar in their non-observed characteristics allows the estimation of a joint year-specific fixed effect for each country cluster. In comparison to GRUNEWALD ET AL. (2017), who also apply this estimator, we include all control variables for the grouping procedure to avoid potential bias. To correct for time dependence, we cluster standard errors on the country level.

We estimate the following model for the Ecological Footprint of grazing land and the three indicators associated with the triple burden of malnutrition (represented, respectively, by Ω_{it}):

$$\text{(1)} \quad \ln\Omega_{it} = \alpha + \beta_1 \ln GDP_{it} + \beta_2 (\ln GDP_{it})^2 + \beta_3 \ln Gini_{it} + \beta_4 \ln Gini^2_{it}$$

$$+ \beta_5 \ln GDP_{it} * \ln Gini_{it} + \gamma X_{it} + \delta_{g_i t} + \varepsilon_{it}$$

Countries are indicated by index i, years by t, and the group, which country i belongs to, is g_i. Ω represents the dependent variable (subindices of the Ecological Footprint), *GDP* is average country income, *Gini* is the Gini inequality indicator, and the vector X includes the control variables. Finally, the remaining variation is split into the grouped fixed effect δ, capturing the unobserved heterogeneity of group g at time t, and the idiosyncratic error term ε.

3.3 Data

The econometric analyses are carried out based on an unbalanced panel data set on the country level which combines publicly available information from the sources described below. The combined data set contains 3,029 observations from 117 countries over the years 1961 to 2016 for the grazing land estimation, and between 2140 and 2200 for the nutrition estimations[3]. Table 1 provides summary statistics on all variables that enter the estimations.

The dependent variable that measures beef consumption is the Ecological Footprint of *grazing land* (used for beef production), available from the Global Footprint Network. The EF accounts

[3] The panel is unbalanced because a greater number of observations is available in the later years: Before 1990, the number of observations per year is below 50, while for the years from 2000 onward, the number of yearly observations increases to more than 100.

not only for the environmental impact from food consumption stemming from national food production, but also for the footprints embodied in imports and exports of food products. The indicators of nutritional quality are obtained from the World Development Indicators published by The World Bank.

The explanatory variable of key interest is income inequality. Income inequality can be measured along three dimensions, to be selected depending on the type of research question and methodology: The inequality of the global population, the inequality between countries, and the inequality within countries. This study relies on a cross-country panel analysis, so the inequality measure suited is the inequality within each country for each year of observation. One of the most comprehensive data sources for internationally comparable inequality figures is the Standardized World Income Inequality Database SWIID (SOLT, 2019). This database uses the Luxembourg Income Study data and other secondary information to estimate different comparable Gini indices, from which we take the market income Gini.

The regression analysis further includes the *GDP p.c.* of all countries as an explanatory variable due to the broad literature on the effects of income on different dimensions of environmental impact (for an overview see KOPP AND NABERNEGG, 2022). Other control variables are the composition of the economy (i.e., the relative weight of the agricultural, manufacture, and service sectors in the economy) and the degree of urbanization. These variables are obtained from the World Development Indicators as well.

Table 1: Summary statistics

Variable	Description	Source	Obs.	Mean	SD	Min	Max	Median
Dependent variables								
Stunting	Modelled estimates of prevalence of stunting (height for age, % of children under 5)	Global Health Observatory Data Repository	2,142	21.61	15.30	1.20	62.30	18.9
Overweight	Modelled estimates of prevalence of overweight (% of children under 5)	Global Health Observatory Data Repository	2,145	7.27	4.49	0.70	29.30	6.40
Anaemia	Prevalence of anaemia among children (% of children ages 6-59 months	Global Health Observatory Data Repository	2,196	34.37	20.81	9.30	88.40	27.45
Grazing land	Ecological footprint in global hectares p.c.	Global Footprint Network	3,029	0.32	0.36	0.002	5.17	0.208
Explanatory variable of interest								
Gini	Market income inequality (pre-tax, pre-transfer)	Standardized World Income Inequality Database	3,029	45.61	6.19	31.00	71.30	45.40
Control variables								
GDP p.c.	*Per capita* income in constant USD (2010)	The World Bank	3,029	12,718	18,324	184	111,968	4,425
Agriculture	value added (% of GDP)	The World Bank	3,029	13.83	12.95	0.03	61.95	8.87
Manufacture	value added (% of GDP)	The World Bank	3,029	14.82	6.35	0.23	41.18	14.69
Service	value added (% of GDP)	The World Bank	3,029	51.28	11.29	12.44	88.72	52.03
Urban	percentage of total population	The World Bank	3,029	54.95	23.60	5.13	100.00	56.86

Source: Own production.

3.4 Results

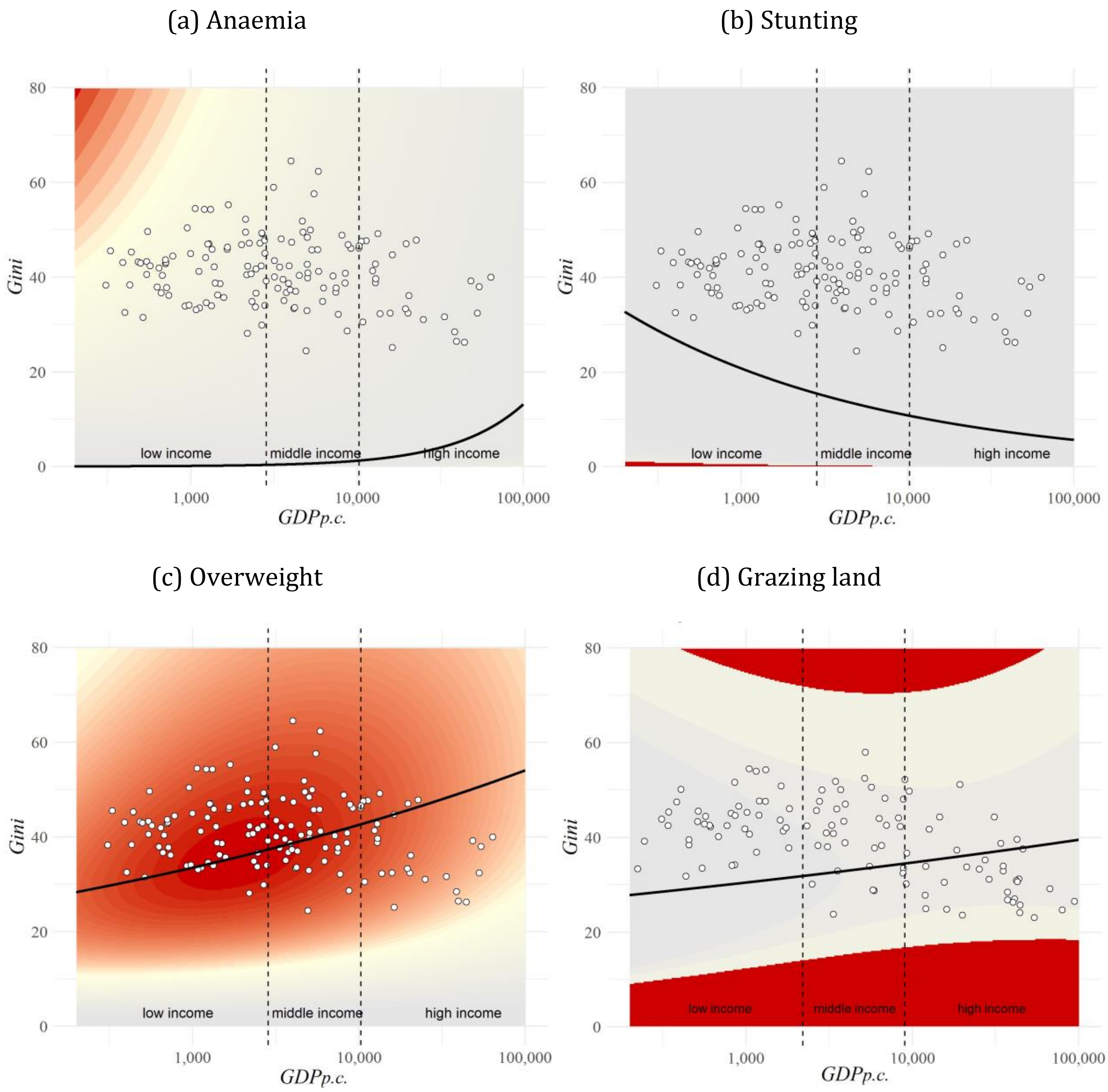
The results of the estimations are displayed in Table 2. While the combination of linear and squared terms with an interaction effect in the estimation has the advantage of creating a relatively flexible functional form, this approach prevents a straightforward interpretation through inspection of the estimated coefficients. We therefore illustrate the parameterized equation as surface diagrams that display the effects of income inequality and income level on nutrition and the land used for grazing, respectively (Figure 2).

Table 2: Regression results: Determinants of nutrition and the footprint of grazing land

Dependent Var.	ln *Stunting*	ln *Overweight*	ln *Anaemia*	ln *Grazing Land*
ln *GDPp.c.*	-1.237	0.118	0.221	3.898
	(-1.312)	(0.0914)	(0.409)	(2.254)
(ln *GDPp.c.*)^2	-0.0224	-0.0365	-0.001	-0.120
	(-1.099)	(-0.9860)	(-0.041)	(-2.55)
ln *Gini*	-5.25	3.236	1.227	-22.842
	(-0.822)	(0.392)	(0.333)	(-0.935)
ln (*Gini*)^2	0.527	-0.579	0.0655	3.773
	(0.692)	(-0.597)	(0.157)	(1.173)
(ln *GDPp.c.* * ln *Gini*)	0.297	0.121	-0.136	-0.426
	(1.471)	(0.477)	(-1.256)	(-0.950)
Agriculture	0.0228	-0.0219	0.008	-0.006
	(2.676)	(-2.152)	(1.321)	(-0.417)
Manufacture	0.026	-0.009	0.006	-0.057
	(3.572)	(-0.975)	(1.0526)	(-4.183)
Service	0.014	-0.020	-0.002	-0.002
	(1.508)	(-2.021)	(-0.295)	(-0.307)
Urban	-0.003	0.002	-0.000	0.028
	(-0.744)	(0.684)	(-0.178)	(3.658)
Constant	16.015	-2.743	0.278	21.066
	(1.115)	(-0.148)	(0.033)	(0.448)
Observations	2,142	2,145	2,196	3,029
R-squared	0.807	0.327	0.831	0.539

Robust t-statistics in parentheses.
Estimated as Group Fixed Effects estimation. The columns present the results for land dedicated to beef and to crop production, respectively. The number of groups was set to 4 for all EF categories, and the number of iterations for the Algorithm 1 was set to 10. For further details on the estimation method, see BONHOMME AND MANRESA (2015). *p−values* and asterisks of statistical significance are omitted to avoid over-emphasizing statistical significance (IMBENS, 2021). Statistical significance was tested through Wald tests for joint statistical significance of all terms that included the GDP and Gini measures, respectively.

Figure 2: Surface plots of the estimated effects of income and inequality on nutritional outcomes and the ecological footprint of grazing land



Source: Own production.
Notes: $GDPp.c._{it}$ is displayed on the horizontal axis in log-scales, $Gini_{it}$ is displayed on the vertical axis in percent. The depending variables are illustrated by the colouring scheme. Dark shadings point towards a high level of the dependent variable and light ones to a low one. Countries in the sample are represented as white dots, where each country dot indicates the average value of the period from 1961-2016. Vertical lines separate low-, middle- and high-income economies.

4 Discussion

In Figure 2, the Subfigures 2a and 2b indicate that increasing overall incomes increase nutritional quality, *c.p.*, as does decreasing inequality. Regarding overweight, Subfigure 1c indicates that obesity increases when in low-income countries the lower income households' financial means increase as a result of decreasing inequality levels. This is also true for middle income countries with high initial inequality while for others, which have lower initial inequality, obesity levels decrease with further reductions in inequality. In rich counties, decreasing levels of inequality go hand in hand with decreasing levels of obesity. One potential reason is a dominating effect of conspicuous consumption of low-quality food.

Figure 2d illustrates the combined effect of inequality of a country and mean income level on the grazing land footprint. The figure suggests that inequality reductions decrease the EF stemming from the consumption of beef in low- and middle-income countries while the opposite is true in high income countries, where a reduction in income inequality increases aggregated beef consumption. For the low- and middle-income countries, this implies that the reduction of the wealthy individuals' consumption due to reductions in inequality is not counterbalanced by the increase of the poors' consumption. This result suggests that beef may be considered as an indicator of higher socioeconomic status in those countries. In addition to conspicuous consumption, a second channel that may lead to higher beef consumption with higher levels of inequality is the *emulation effect* or *expenditure cascades* (JORGENSON ET AL., 2016; FRANK ET AL., 2010), i.e., the rich individuals' carbon-intensive lifestyle, which affects the rest of the society who take the rich as role models (KLASEN, 2018). In general, red and processed meats have been cause of major concern regarding their environmental impacts. While beef can be an important contributor to nutritional diversity, especially in low-income countries, its production also causes pressing problems for environmental sustainability. These include not only greenhouse gas emissions, but also involve a much higher use of water, land and biomass to produce each unit of beef product, compared to other livestock systems, even when adjusting for the high nutrition that beef provides (GERBER ET AL., 2015). Hence, the high demand and consumption of beef means that its production causes a considerable pressure on the environment. In high income countries with initially low inequality levels, the result is the opposite: Here a further reduction in income inequality would be associated with an increase in beef consumption. This would be problematic as well, both from a nutritional perspective and also from the environmental dimension, given the greenhouse gas emissions associated with beef production (MICHAELOWA AND DRANSFELD, 2008; WILLETT ET AL., 2019).

5 Conclusion

The key findings of this study are that trade-offs between the political targets of reducing inequality, improving nutrition, and cutting greenhouse gas emissions exist in countries with initially high average incomes and relatively low inequality levels and poor, unequal countries. This appears especially problematic when considering the actual problems are of the opposite nature as in the countries, in which a reduction in inequality would bring about an increase in beef consumption, are precisely the countries where consumers already consume meat at a level that is detrimental for both public and planetary health.

In terms of policy implications in combating overweight, the results indicate that for low- and middle-income countries that - if the reason for overweight is status consumption - measures to decrease inequality should be accompanied by campaigns on healthy diets. If the reason is that the cheapest food is unhealthy food, then other policies should be applied, for example taxes on unhealthy food products, following the example of the sugar taxes recently introduced in the UK and other countries (FERNANDEZ AND RAINE, 2019).

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