Economic globalization, inequality and body mass index: a cross-national analysis of 127 countries

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This article investigates to what extent the worldwide increase in body mass index (BMI) has been affected by economic globalization and inequality. We used time-series and longitudinal cross-national analysis of 127 countries from 1980 to 2008. Data on mean adult BMI were obtained from the Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group. Globalization was measured using the Swiss Economic Institute (KOF) index of economic globalization. Economic inequality between countries was measured with the mean difference in gross domestic product per capita purchasing power parity in international dollars. Economic inequality within countries was measured using the Gini index from the Standardized World Income Inequality Database. Other covariates including poverty, population size, urban population, openness to trade and foreign direct investment were taken from the World Development Indicators (WDI) database. Time-series regression analyses showed that the global increase in BMI is positively associated with both the index of economic globalization and inequality between countries, after adjustment for covariates. Longitudinal panel data analyses showed that the association between economic globalization and BMI is robust after controlling for all covariates and using different estimators. The association between economic inequality within countries and BMI, however, was significant only among high-income nations. More research is needed to study the pathways between economic globalization and BMI. These findings, however, contribute to explaining how contemporary globalization can be reformed to promote better health and control the global obesity epidemic.

Keywords: globalization; obesity; income inequality; trade liberalization and foreign direct investment

Introduction

Over the past 30 years, most countries in the world have experienced substantial increases in obesity and overweight (Finuncane et al. 2011; Yach, Stuckler, and Brownell 2006). At the same time, they have undergone a process of rapid economic integration and deregulation of trade and capital flows (Dreher, Gaston, and Martens 2008).
Previous studies have identified aspects of globalization, such as trade liberalization and foreign direct investment (FDI), as contributing factors behind the changes in people’s dietary patterns worldwide (Hawkes 2009). However, there are multiple other pathways by which economic globalization can affect body mass index (BMI).

So far, little research has investigated the role of economic inequality between and within countries in explaining the association between global economic reforms and obesity. However, dimensions of economic globalization, such as trade openness and capital liberalization, have generated imbalances of wealth and power between rich and poor countries (Schrecker, Labonte, and De Vogli 2008). Although the debate is far from conclusive (Dreher and Gaston 2008), empirical evidence shows that since the beginning of the globalization era, inequalities in wealth between high and low-income countries have widened considerably (Dorling, Shaw, and Davey-Smith 2006). One of the possible mechanisms responsible for the widening gap between affluent and low-income nations is the liberalization of trade and investment that, among other effects, disproportionately benefited large transnational companies (TNCs), mainly concentrated in rich countries. Among the TNCs that have benefited from the new opportunities to penetrate foreign markets created by economic globalization, transnational food companies (TFCs) are of particular interest for the obesity epidemic. By taking advantage of global reforms of trade liberalization and FDI, TFCs have grown in terms of power and market shares, and have thus flooded foreign markets with highly processed food, fast food and other unhealthy food items (De Vogli, Kouvonen, and Gimeno 2011; Hawkes 2005; Thow and Hawkes 2009).

But economic globalization reforms may have also affected obesity by widening economic gaps not only between rich and poor countries, but also within countries (Bergh and Nilsson 2010; Cornia, Rosignoli, and Tiberti 2007). The globalization of trade and finance can generate higher inequalities in wealth by depressing taxation and wages (Crotty, Epstein, and Kelly 1998) which, in turn, weakens the bargaining power of states and unions at the expense of large corporations and financial elites. Outsourcing and the threat of capital flight in particular have been identified as key promoters of downward pressures on government revenues and wages (Rodrik 1997), that are key factors influencing economic inequalities within countries. It is also plausible to assume that these changes in income distribution induced by globalization may have affected dietary patterns, and ultimately obesity. Research shows that obesity is more prevalent in countries that are characterized by less egalitarian distributions of wealth, substantially weaker social welfare systems (Wilkinson and Pickett 2009), and more aggressive neoliberal market policies (Offer, Pechey, and Ulijaszek 2010). The main mechanisms by which economic inequality affects obesity can be grouped in two major categories: material deprivation (Lynch et al. 2000) and psychosocial stress (Marmot and Wilkinson 2001). On the one hand, economic inequality promotes obesity through poverty, higher risk of unemployment and limited social safety nets that increase economic insecurity (Smith, Stoddard, and Barnes 2009). On the other hand, economic insecurity generates stress which in turn can increase obesity directly through adverse biological and metabolic responses or indirectly through behavioral responses such as excess energy intake and reduced physical activity (Brunner, Chandola, and Marmot 2007).

Although the linkages between globalization and inequality, and inequality and obesity have already been studied in previous research, we are not aware of any previous study that has examined their interrelationships. This article investigates to what extent economic globalization has affected the worldwide increase in mean BMI and the role of inequality between and within countries in influencing this association.
Methods

Study design
The analyses consisted of time-series and panel data analyses of 127 low-, middle- and high-income countries over the period 1980–2008. In order to adequately analyze the association between economic globalization and BMI with a strongly balanced sample, only countries with data on both variables of interest for the whole period of 1980–2008 were included. Nations with a population of fewer than 500,000 inhabitants in 2008 were excluded from the sample. Countries were grouped according to the World Bank classification of income groups: low-income ($1005 or less); lower-middle income ($1006–$3975); upper-middle-income ($3976–$12,275) and high-income ($12,276 or more). Information on the list of countries by region selected in the study is available upon request (Appendix 1).

Body mass index
Data on the mean adult BMI in kg/m² were obtained from the Global Burden of Metabo- llic Risk Factors of Chronic Diseases Collaborating Group that produced comparative estimates of cross-country differences and changes over time in BMI for adults aged 20 years old and older. Standardized information on BMI is available for about 200 countries between 1980 and 2008 (Finuncane et al. 2011). Although data on BMI are reported separately for men and women, we have produced an overall indicator by estimating the female-male ratio using the proportion of female population from the World Development Indicators from 1980 to 2008.

Economic globalization
Economic globalization was measured using the Konjunkturforschungsstelle (KOF) index of economic globalization. KOF is an abbreviation that stands for ‘Konjunkturforschungsstelle,’ an indicator developed by the Swiss Economic Institute. The KOF index attempts to measure the degree to which a nation exchanges goods, capital, people, ideas, and information. It includes three dimensions: economic, social, and political globalization (Dreher, Gaston, and Martens 2008). In this article, our attention is limited to the KOF index of economic globalization, a composite indicator comprising two main dimensions: trade and capital flows and restrictions on trade and capital. Actual trade and capital flows include foreign direct investment, portfolio investment, income payments to foreign nationals each measured as percentage of gross domestic product (GDP). Restrictions on trade and capital include hidden import barriers, mean tariff rate, taxes on international trade and capital account restrictions. The index goes from 0 to 100 with higher values indicating a higher degree of economic globalization. The KOF index of economic globalization was found to be strongly associated with other measures of economic openness such as the Economic Freedom of the World ($r=.77; p < .001$), and its subcomponents including the ‘freedom to trade internationally’ ($r=.84; p < .001$), and ‘less regulation of credit markets, labor markets and business’ ($r=.65; p < .001$) (Bergh and Nilsson 2010). In our sample of 127 countries, the most economically ‘globalized’ country is Singapore (KOF-EG = 96.8), while lowest score in the KOF economic globalization index is assigned to Ethiopia (KOF-E = 25.1). More information about the dimensions and sub-dimensions of the KOF index of economic globalization is available upon request (Appendix 2).
Economic inequalities

Economic inequality between countries was measured through the mean difference for GDP per capita taken from the WDI database (World Bank 2012). Information on GDP per capita was converted to international dollars using purchasing power parities (PPP). The mean difference is a measure of absolute variation (Goldstein 1995), or the average of the differences between all pairs of numbers, \( i \) and \( j \), included in the sample of countries. It corresponds to ‘an intrinsic measure of the average distance between observations’ (Gastwirth 1988). Economic inequality within countries, measured by the Gini index in household disposable income and household gross income, were taken from the Standardized World Income Inequality Database (SWIID) in 2012 (Solt 2008). This dataset is an adaptation of the World Income Inequality Database (WIID) developed by the World Institute for Development Economic Research. The WIID includes different measures of inequality from low-, middle- and high-income countries since 1970. The main limitation of the WIID is the comparability of its observations across countries and time (Deininger and Squire 1996), partially overcome by the SWIID after the use of various techniques to estimate the ratios between different types of Gini coefficients and the computation of estimates of uncertainty for observations (Solt 2008).

Covariates

Established potential confounding factors that could explain away the association between the KOF index of economic globalization and BMI included GDP per capita, the proportion of population living in urban areas and population size. Additional covariates included openness to trade (imports and exports as % of GDP) and FDI (as% of GDP). These two constructs are sub-dimensions of the KOF index of economic globalization. They were used here as robustness checks to examine whether the association between the KOF index of economic globalization and BMI disappeared after the inclusion of these two indicators in the regression models. Some analyses included a measure of absolute poverty, or material deprivation, expressed as the percentage of population living with less than $1.25 a day at 2005 international prices. Information about covariates and poverty were taken from the World Bank’s WDI database (World Bank 2012).

Statistical analyses

Aggregate associations between the KOF index of economic globalization, mean difference in GDP per capita and BMI over time were investigated through a number of time-series regression models. Standard assumptions of regression analysis usually do not apply in time-series data. Indeed, the Durbin–Watson test (Durbin and Watson 1951) indicated the presence of serial correlation in the data series suggesting that a correction was necessary. First, we used ordinary least squares (OLS) models with lagged independent variables and included a time trend control to the regression (detrrending). Then, we developed OLS models with Newey-West standard errors to overcome problems of autocorrelation and heteroskedasticity (Newey and West 1987). An analysis of autocorrelation and partial autocorrelation showed that a correction with a lag of one year was optimal; therefore, Newey–West standard errors allowing for one lag were therefore adopted. We also used Prais–Winsten feasible generalised least squares (FGLS) regression models as additional methods to correct for auto-correlated
standard errors. We compared these estimators against OLS models and OLS with Newey–West standard errors.

Longitudinal panel analyses were used to investigate the role of inequality within countries as potential mechanism explaining the association between globalization and BMI. Panel data models, that allow regression analyses with both a spatial and a temporal dimension, have several advantages over cross-sections and time-series. First, they account the non-independence of observations for the same country across time. Second, they are more informative and allow the study of changes over time. Third, they control for the heterogeneity of the countries included in the study (Baltagi 2008). The two most widely used panel data methods include the fixed-effects and random-effects models. Fixed-effects models account for the unobserved factors that differ between countries and are constant over time (e.g. welfare state, geographical location, and cultural factors). The main alternative, the random-effects model, relies on the assumption that independent variables and error terms are uncorrelated (Wooldridge 2009). The random-effects model is often a more promising option when the number of countries far exceeds the number of waves, as is the case of the present study. When $N$ is very large, fixed-effects models tend to be less efficient than random-effects models, especially because they consume a degree of freedom for every additional country (Greene 2012).

Fixed and random effects were contrasted against standard OLS models through several tests. Testing for fixed-effects involved comparing the pooled OLS results with the results of the fixed-effects estimation. The Lagrange Multiplier test (Breusch and Pagan 1980) was used to compare the random effects model with the OLS model (a significant $p$-value favoring random models over OLS). The Hausman test (Hausman 1978) was used to compare random versus fixed-effects models (a significant $p$-value favors fixed-effects models over random-effects models).

After testing the different models of specification, we formulated the following empirical model:

$$\text{BMI}_{it} = \alpha + \beta_1 \text{Globalisation}_{it} + \beta_2 \text{Inequality}_{it} + \beta_3 \text{GDP}_{it} + \beta_4 \text{Urban}_{it} \ldots + \nu_i + \epsilon_{it}$$

where $i$ is the country, $t$ is the year, $\beta_1$ is the regression coefficient for KOF index of economic globalization, $\beta_2$ is the regression coefficient for Gini index, $\beta_3$ is the regression coefficient for GDP per capita, $\beta_4$ is the regression coefficient for urbanization, $\nu_i$ and $\epsilon_{it}$ denote the random error terms and $\alpha$ is a constant.

Panel data models can present problems of multicollinearity between highly correlated predictors that could potentially result in unstable coefficients and standard errors. As an indicator of multicollinearity, we used variance inflation factor values greater than or equal to 10 (Belsley 1991). There could also be problems of heteroskedasticity or autocorrelation over time that can further bias estimations. Our analyses used heteroskedasticity and cluster-robust standard errors (Baum 2006).

Robustness assessments involved running separated multivariate models by gender, adding covariates and using lagged independent variables. Statistical analyses were conducted using Stata 12.0 software (StataCorp LP, College Station, TX).

Results

Figure 1 presents aggregate trends over time in worldwide BMI, KOF index of economic globalization and mean difference of GDP per capita for 127 countries between 1980 and 2008 using time as the unit of the analysis. Results show that in less than
Figure 1. Trends over time in average global body mass index and global mean difference in GDP per capita (a) and KOF economic globalization index (b) for 127 countries 1980–2008.
<table>
<thead>
<tr>
<th></th>
<th>OLS (1)</th>
<th>OLS (2)</th>
<th>Newey–West s.e. (3)</th>
<th>Newey–West s.e. (4)</th>
<th>Prais–Winsten (5)</th>
<th>Prais–Winsten (6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KOF index of economic globalization (lagged by 1 year)</td>
<td>0.0358***</td>
<td>0.00846*</td>
<td>0.0307***</td>
<td>0.00409</td>
<td>0.0138*</td>
<td>0.00003</td>
</tr>
<tr>
<td></td>
<td>(6.34)</td>
<td>(2.40)</td>
<td>(5.29)</td>
<td>(1.51)</td>
<td>(2.64)</td>
<td>(−0.01)</td>
</tr>
<tr>
<td>Mean difference in GDP per capita (lagged by 1 year)</td>
<td>0.00008***</td>
<td>0.00008***</td>
<td>0.00008***</td>
<td>0.00005***</td>
<td>0.00005***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(10.63)</td>
<td>(15.34)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year</td>
<td>0.0408***</td>
<td>0.0290***</td>
<td>0.0442***</td>
<td>0.0306***</td>
<td>0.0596***</td>
<td>0.0480***</td>
</tr>
<tr>
<td><strong>Model statistics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>−59.14***</td>
<td>−35.03***</td>
<td>−65.74***</td>
<td>−38.05***</td>
<td>−95.52***</td>
<td>−72.26***</td>
</tr>
<tr>
<td></td>
<td>(−6.95)</td>
<td>(−8.18)</td>
<td>(−8.27)</td>
<td>(−10.51)</td>
<td>(−11.02)</td>
<td>(−9.30)</td>
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<td>29</td>
<td>29</td>
<td>29</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

t statistics in parentheses
Notes: Significance: *p < 0.05; **p < 0.01; ***p < 0.001.
Associations were adjusted by GDP per capita, urbanization and population size.
three decades the mean adult BMI increased from 23.06 to 25.00 kg/m². During the same period, the mean KOF index of economic globalization increased from 42.14 to 61.23.
Figure 2. Scatterplots of BMI (kg/m²) and KOF index of economic globalization by income group (a) and selected years (b).
Table 3. OLS, fixed-effects and random effects models of BMI (kg/m²) by lagged KOF index of economic globalization and covariates for 127 countries between 1980 and 2008.

<table>
<thead>
<tr>
<th></th>
<th>OLS (1)</th>
<th>OLS (2)</th>
<th>OLS (3)</th>
<th>Fixed-effects (4)</th>
<th>Fixed-effects (5)</th>
<th>Fixed-effects (6)</th>
<th>Random-effects (7)</th>
<th>Random-effects (8)</th>
<th>Random-effects (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KOF index of economic</td>
<td>0.0399**</td>
<td>0.0462**</td>
<td>0.0308***</td>
<td>0.0255***</td>
<td>0.0248***</td>
<td>0.0180***</td>
<td>0.0261**</td>
<td>0.0254**</td>
<td>0.0195***</td>
</tr>
<tr>
<td>globalization</td>
<td>(13.99)</td>
<td>(16.41)</td>
<td>(5.00)</td>
<td>(5.58)</td>
<td>(5.66)</td>
<td>(4.28)</td>
<td>(5.75)</td>
<td>(5.82)</td>
<td>(4.91)</td>
</tr>
<tr>
<td>Gini index</td>
<td>−0.0014</td>
<td>−0.0014</td>
<td>−0.0014</td>
<td>−0.0071</td>
<td>−0.0071</td>
<td>−0.0654</td>
<td>−0.0654</td>
<td>−0.0654</td>
<td>−0.066*</td>
</tr>
<tr>
<td>(0.43)</td>
<td></td>
<td></td>
<td></td>
<td>(−1.56)</td>
<td>(−1.56)</td>
<td></td>
<td></td>
<td></td>
<td>(−1.44)</td>
</tr>
<tr>
<td>Poverty (% with less $1.25)</td>
<td>−0.0393***</td>
<td></td>
<td></td>
<td>−0.0064*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>−0.066*</td>
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<tr>
<td></td>
<td>(−8.72)</td>
<td></td>
<td></td>
<td>(−2.08)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(−2.12)</td>
</tr>
<tr>
<td>Constant</td>
<td>20.33***</td>
<td>20.41***</td>
<td>22.67***</td>
<td>18.17***</td>
<td>18.55***</td>
<td>18.94***</td>
<td>18.44***</td>
<td>18.87***</td>
<td>19.62***</td>
</tr>
<tr>
<td></td>
<td>(219.51)</td>
<td>(118.80)</td>
<td>(52.55)</td>
<td>(54.11)</td>
<td>(41.34)</td>
<td>(41.06)</td>
<td>(59.64)</td>
<td>(45.23)</td>
<td>(51.40)</td>
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<td>Number of observations</td>
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<td>3233</td>
<td>2513</td>
<td>617</td>
<td>3233</td>
<td>2513</td>
<td>617</td>
</tr>
</tbody>
</table>

Regressions were additionally adjusted for population size, urbanization (% of people living in urban areas), GDP per capita (PPP international $), trade (% of GDP), and FDI (% of GDP).

t statistics in parentheses. Robust standard errors.

Notes: Significance: *p < 0.05; **p < 0.01; ***p < 0.001.
Our measure of economic inequality between countries, the mean difference of GDP per capita, increased sharply from $3880 in 1980 to $15,758 in 2008.

We conducted multivariate time-series analyses to examine whether these trends reflected significant, robust relationships between variables of interest. In Table 1, we report the estimates of OLS, OLS with Newey–West standard errors and the results of Prais–Winsten FGLS estimates. After adjustment for GDP per capita, urbanization and population size, we found statistically significant associations between the KOF index of economic globalization and BMI ($p < .0001$). When the mean difference in GDP per capita between countries was included in the analysis, the association between the KOF index of economic globalization and BMI substantially decreased, suggesting a potential role of economic inequality as a mediator of the relationship.

Table 2 presents descriptive statistics for the dependent and independent variables within countries in 1980, 1990, 2000 and 2008 using countries as units of analysis. Data on trends over time in BMI and KOF economic globalization index for each of the 127 countries from 1980 to 2008 is available upon request (Appendix 3). The increase in income inequality within countries was not unequivocal. When using longitudinal data for each country, the mean Gini index increased from 38.24 in 1980 to 39.94 in 2000 and then declined to 38.48 in 2008. Of countries with available data in both years 2008 and 1980, the Gini index increased in 23 nations and decreased in 16 of them (data not shown). When considering changes in covariates of interest, such as GDP per capita, urbanization, trade openness, and FDI, results showed similar upward trends over time.

Economic globalization was statistically significantly associated with BMI ($p < .05$) across all income groups. When stratifying the correlation by each year from 1980 to 2008 (data not shown), the associations between KOF index and BMI remained statistically significant ($p < .05$). Figure 2(a) and (b) present scatter plots for BMI and the KOF index of economic globalization by income group and for the years 1980, 1990, 2000, and 2008.

Table 3 presents the results of cross-national panel analyses comparing estimates of the OLS, fixed-effects and random-effects models with the mean BMI as the dependent variable. These analyses show that the association between BMI and the KOF index of economic globalization is robust across different models of estimation, and after controlling for selected covariates. Within-country economic inequality was not associated with BMI. Poverty was negatively related to BMI in all three models. We performed a series of tests to assess the efficiency of these different models. The Lagrange Multiplier test was strongly significant ($p = .00001$) and suggested that a pooled regression model (OLS) was inappropriate. The Hausman test, that compares random versus fixed effects models, was not significant ($p = .59$) and indicated that a random-effects model was more efficient. In all models, we employed robust standard errors to account for heteroskedasticity.

Robustness checks included the estimation of the random-effects model by gender. Results confirmed that the association between the KOF index of economic globalization and BMI is robust. Random-effects estimates adjusted by covariates and stratified by gender are available upon request (Appendix 4). We also performed additional tests to examine the association between economic inequality and BMI by income group and by region. Inequality was significantly associated with BMI only among the Organisation for Economic Co-operation and Development (OECD) nations. When adjusting for all covariates and using different methods of estimation (OLS, fixed effects and random effects), the association between inequality and BMI in OECD nations remained statistically significant (estimates are available upon request in Appendix 5). Additional
analyses using Gini index in household gross income, instead of Gini index in household (pre-tax, and pre-transfer) disposable income, provided similar results (data not shown).

Conclusion

The aims of this article were to investigate the association between economic globalization and BMI and the role of economic inequality (between and within countries) in affecting this association. Using aggregate time-series data from 127 countries, the results showed that increases in the KOF index for economic globalization are positively associated with increases in mean BMI worldwide after adjustment for GDP per capita, urbanization, and population size. Longitudinal cross-national panel data analyses on the KOF index of economic globalization and BMI confirmed the results observed in time-series analyses. The relationship remained significant after adjustment for GDP per capita, poverty, the proportion of people living in urban areas and population size. It was still significant when using unbalanced models with fewer data points that included poverty or a measure of within-country inequality, the Gini index. Additional adjustment for trade openness and FDI, two of the major components of the KOF economic globalization index, did not affect the strength of the association that was also robust across different methods of estimation.

In addition, results showed that the hypothesis that economic inequality may play a role in the association between the KOF index of economic globalization and BMI seems plausible when considering inequalities between countries. The exact mechanisms connecting economic globalization, inequality between countries and BMI remain to be clarified. Future research must specify how the liberalization of capital and trade may affect BMI by facilitating the growth and indiscriminate mobility of TNCs across borders (Tausch 2012) with particular reference to TFCs. Previous authors have argued that the worldwide proliferation of TFCs may have, indeed, played a key role in influencing the obesity epidemic, especially through the diffusion of highly processed food, soft drinks and fast food (Hawkes 2005, Thow and Hawkes 2009, De Vogli, Kouvonen, and Gimeno 2011). When looking at the role of economic inequalities within countries, in line with previous research (Pickett et al. 2005), the Gini index was positively associated with BMI only among the most affluent nations. However, as other studies have shown, this was not the case in low- and middle-income countries (Jones-Smith et al. 2010). In many parts of the developing world, poverty is still endemic and the mean BMI is a poor indicator of obesity, especially because it is strongly affected by the substantially higher prevalence of malnutrition and underweight compared to affluent nations.

It has also been plausibly suggested that widespread use of cheap fossil fuels could be at the root of the obesity epidemic (Roberts and Edwards 2010). Although cheap petroleum has surely facilitated the diffusion of globalization and traveling, and the obesity epidemic, decision-making processes on the use of fossil fuels are influenced by global economic policies and inequalities in wealth and power between and within countries.

Our results must be interpreted with caution. First, BMI indicators from the Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group are not data in the usual sense, but rather estimates from a Bayesian hierarchical model that involve a quite complex dependence structure that was impossible to adjust for. Second, our analyses did not take into account that BMI is not monotonically related to health outcomes, but especially in low-income countries an increase in BMI may be a
symptom of health improvement or reduction of malnutrition. However, a continuous variable such as BMI is preferable to obesity for its association with most diseases is continuous (Mhurchu et al. 2004) (Prospective Studies Collaboration et al. 2009).

Another limitation is that, although the KOF index of economic globalization is widely recognized and used as a valid measure of economic integration, globalization is a complex and multifaceted concept that can be hardly quantified by a single indicator. By using an overall measure of globalization, the study did not address the specific associations between sub-dimensions of economic globalization and BMI. This choice, however, was obliged also because of problems of multicollinearity that produce biased results when including multiple sub-dimensions of the same construct in a regression line. Another potential limitation is that ecological analyses, like the ones presented in this article, may not be very consistent with results from studies using individual level data (Pearce 2000). Nevertheless, studies that use aggregate data are important when focusing on societal level variations, rather than individual differences in obesity. Finally, given the observational nature of the data, firm conclusions cannot be drawn regarding the causal nature of the association between globalization and BMI. Nevertheless, the longitudinal nature of the study design provides more information about the direction and magnitude of the relationships of interest than a cross-sectional study.

In spite of these shortcomings, our study provides novel findings of the association between globalization, economic inequality and obesity. Although results are preliminary and exploratory, they suggest that global economic policies, including trade and capital liberalization reforms, may indirectly affect BMI at the population level. More research is needed to investigate whether rapid and indiscriminate economic liberalization policies affect health outcomes (Labonte and Torgerson 2005) including BMI. This may contribute to elucidate the mechanisms by which contemporary globalization can be reformed to promote better health and control the obesity epidemic in both the developed and the developing world.

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