Obesity, Openness and Women’s Empowerment: An Empirical Test

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Abstract: Worldwide obesity has more than doubled since 1980. We test competing explanations for the global rise of obesity including the effects of economic globalization, domestic economic development and women’s empowerment. We hypothesize that although researchers have tended to focus on how trade openness contributes to obesity by flooding low-income country markets with cheap but unhealthy foods, that domestic food production in response to economic development and women’s labor force participation are more likely explanations for rising obesity. As countries develop economically and women enter the labor force, we expect a higher consumption of obesogenic prepared foods. We test these different theories for the rise of global obesity using a longitudinal dataset of mean body mass index and information from the Quality of Government dataset (QoG) that covers 170 countries from 1993-2010. Contrary to hypothesis, we find economic globalization to predict a country's likelihood of being obese accounting for GDP and a strong negative relationship between women’s labor force participation and male obesity and a weak relationship for women. Countries where women work more actually tend to have thinner men and women adjusting for other factors.

Introduction

Worldwide obesity has more than doubled since 1980 and most of the world's population now live in countries where overweight and obesity kills more people than underweight. Research on the rise of global obesity rates has tended to explain the increase in obesity as a manifestation of economic globalization. For instance, global trade agreements that open economies to transnational food corporations seeking new markets for their products are explanations that have been blamed for the rise in rates of obesity in LMICs.

However, there exists little evidence that the global penetration of transnational corporations is what is driving obesity separate from domestic economic development trends. Many countries around the world have been experiencing rapid economic growth. An alternative explanation for the global rise in obesity is that countries are experiencing domestic “nutrition transitions,” the shift from a primarily plant based diet to a meat and processed food diet. Even in the absence of increased exposure to global markets, burgeoning middle classes in countries may increase demand for a richer diet and prepared foods, including local foods. In this “modernization theory” view of obesity, development inexorably leads to health transitions, including the rise of unhealthy lifestyles as people have more disposable income.

A third explanation for the global rise in obesity has to do with women’s changing role in society. Countries vary in the degree to which they have guaranteed equal rights and representation to women and women’s participation in the labor force. Women’s labor force participation and has been linked to rising obesity rates. Though mechanisms are not well understood, working women may have less time to prepare healthy meals and may rely more
on prepared foods. that are more empowered socially and legally may also experience less constrained gender roles that tie them to traditional homemaking roles including cooking. Previous studies have not examined women’s empowerment and its relation to obesity across countries.

Finally, other elements of globalization, apart from economic globalization, may contribute to rising obesity rates globally. Cultural globalization, or “Westernization,” may encourage the consumption of fast foods like McDonalds to appear more "modern". This may be less due to economics and more due to the cultural appeal of Western lifestyles, which unfortunately may contribute to obesity.

We test these different theories for the rise of global obesity using a longitudinal dataset of mean body mass index and information from the Quality of Government dataset (QoG) that covers 170 countries from 1993-2010 (see Conceptual Model in Appendix).

- We hypothesize that countries with higher GDPs will have higher rates of obesity regardless of their degree of globalization.
- We further hypothesize that countries with higher women’s labor force participation will have higher rates of obesity adjusting for their GDP and their degree of globalization.

**Methods**

**Dependent variable**

*Mean body mass index (country).* Country-level mean, age standardized BMI for men and women was accessed from the Global Burden of Metabolic Risk Factors of Chronic Diseases Collaborating Group at Imperial College London viii ix Standardized information on BMI is available for about 200 countries between 1980 and 2008. Data on BMI are reported separately for men and women. Because of the narrow range of mean BMI (1.8-3.2), we ran models both with a continuous measure and with a dichotomous measure. To make the dichotomous measure, we recoded mean BMI to represent whether a country was on average overweight or normal weight.

**Independent Variables**

*Economic globalization.* Economic globalization was measured using the Konjunkturforschungsstelle (KOF) index of economic globalization, an indicator developed by the Swiss Economic Institute. The KOF index includes three dimensions: economic, social, and political globalization (Dreher, Gaston, and Martens 2008). Economic globalization represents a composite of two main dimensions: trade and capital flows and restrictions on trade and capital. Economic globalization includes information on actual trade flows including trade, foreign direct investment, stocks, portfolio Investment, and income payments to foreign nationals all as a percent of GDP. Trade Restrictions include hidden Import barriers, the mean tariff rate, taxes on International Trade (percent of current revenue and capital account restrictions. Data are available on a yearly basis for 207 countries over the period 1970 - 2012. We examined the period 1990-2012.

*Social Globalization.* The KOF index also captures “social globalization” through three principles categories- personal contacts, information flows and cultural proximity. We were
particularly interested in the cultural proximity measures, which includes the number of McDonald's restaurants per capita as well as the number of Ikea per capita and trade in books. Information flows included the number of internet Users per 1000 people, televisions per 1000 people, and trade in newspapers as a percent of GDP. Data on personal contacts included international telephone and mail traffic per capita, transfers as a percent of GDP, international tourism, and the percent of the population that is foreign.

Economic Development. Standard Measures of gross domestic product per capita were available from the Quality of Governance (QoG) indicators, which has compiled time-series data of over 2000 variables between 1980-2015 including a variety of measures of economic development. 

Women’s labor force participation. Women’s labor force participation from the World Development Indicators was accessed through the QoG data. Data are available from 1990-2012, representing the percent of women that work in the formal labor market.

Women’s social empowerment. We also measured women’s social empowerment using the Cingranelli-Richards (CIRI) Human Rights Database. The CIRI dataset codes countries over time based on internationally recognized human rights standards. We examined women’s social rights, which includes measures that capture their ability to equally participate in social life. We included women’s economic rights as a measure of women’s empowerment in addition to their actual labor force participation because we believe these are different constructs. Although the CIRI dataset also has information on women’s economic rights, we believed that actual participation in the labor market should be a stronger predictor of obesity than the degree to which they are free to participate in the labor market.

Food supply. We collected data from the Food and Agriculture Organization of the United Nations (FAO) on countries’ consumption of total calorie, fat and protein per capita per day. We use these measures to proxy for the degree to which a country has made the nutrition transition to a high protein, high fat diet. The food environment influences dietary behaviors. The availability of food influences individual’s day to day dietary choices, and accumulately, body weight. We add these as effect mediators to see if the effect of economic or cultural globalization on obesity can be explained by these measures.

Control Variables

Democratization. Because countries that are democratic tend to have higher GDPs and may be more likely to have open economies and women’s empowerment, we control for a country’s level of political democracy with the Policy IV data. Polity IV is a commonly used measure of

1 The measure of women’s social rights includes the following: Women's social rights include a number of internationally recognized rights. These include the right to equal inheritance; the right to enter into marriage on a basis of equality with men; the right to travel abroad; the right to obtain a passport; the right to confer citizenship to children or a husband; the right to initiate a divorce; the right to own, acquire, manage, and retain property brought into marriage; the right to participate in social, cultural, and community activities; the right to an education; the freedom to choose a residence/domicile; freedom from female genital mutilation (FGM) of children and of adults without fear of persecution.
political democracy in political science, which ranges from full autocracy to full democracy and covers the period 1963 to present. Data for Polity IV are contained in the the QoG dataset.

**Economic inequality.** Economic inequality has been shown to be associated with higher overall rates of ill health and obesity.\(^{xii}\) More unequal societies are believed to have higher rates of disease and steeper health inequalities within countries. Researchers suspect that low income families, with limited resources for food, may choose food of higher energy over higher quality food (e.g. Brown, 2013)\(^{xiii} \)xiv. Moreover, economic openness has found to be associated with rising inequality as countries reduce domestic social protections to compete economically. We use Gini index to control for this effect.

**Region.** We include region recognizing that certain regions have specific cultural practices that may make them more likely to be heavier on average. We divided into culturally similar regions namely, Eastern Europe and the former Soviet Union, Latin American and the Caribbean, sub-Saharan Africa, Middle East and North Africa (MENA), East Asia, South Asia and the Pacific Islands.

**Analysis**
We first ran bivariate independent sample t-tests with all variables and retained those that were significant for further analysis. We ran all models as logistic mixed models with country and time fixed effects. We lagged all independent variables by one year to account for a time lag on obesity. We hypothesized that economic development and women’s labor force participation and empowerment would be stronger predictors of obesity than economic globalization.

We staggered the introduction of variables to test the effect of each on obesity individually and cumulatively. We first enter GDP and women’s empowerment with control variables to see if they have an independent effect on country BMI adjusting for democratization, economic inequality and region. We then enter the economic and cultural globalization measures. All models were on the period 1990-2012, which had available coverage of data for all variables.

**Results**
We found both social and economic globalization to strongly predict country obesity and to more strongly predict a countries’ likelihood of being obese than GDP for both men and women adjusting for covariates. GDP was inconsistently positively predicted male and female mean BMI depending on the model specification whereas social and economic globalization, and overall globalization (including political globalization) robustly predicted mean BMI. Likewise, women’s labor force participation positively predicted both men’s and women’s mean BMIs adjusting for covariates. Women’s social rights positively predicted male BMI but not female BMI.

Introducing measures designed to capture the degree to which a country has gone through a nutrition transition (e.g., amount of fat, protein and overall calories consumed in a day) did not reduce the significance of the globalization measures. For women, only overall calorie supply was associated with higher weight. For men, fat and calories predicted higher mean BMI. The effect sizes of all major hypothesized variables were quite small however.
Certain regions of the world had consistently higher BMIs over time. The heaviest region was the former Soviet Union and Eastern Europe, which was used as the referent category. Among women, the Pacific islands, North Africa and the Middle East and Latin America and the Caribbean had a higher mean BMI than the former USSR/Eastern Europe.

**Discussion**

We found that both economic and social globalization predict higher mean BMI within countries for both men and women even accounting for the overall level of economic development. The more integrated countries were in the global economy and the more exchange that countries had with other countries both independently predicted obesity rates. This finding supports accounts of rising obesity rates that emphasize how the penetration of the food industry into new markets increases consumption of processed foods, possibly leading to weight gain. The significance of social globalization also suggests other pathways related to cultural influences on food choices.

Although we hypothesized that obesity may be more influenced by domestically-driven nutation transitions, we found little support for the “modernization theory” view that obesity arises inexorably from economic growth. Although weight did increase with economic development, the effect of GDP was more sensitive to model specification whereas economic and social globalization consistently predicted higher mean BMI.

Also surprisingly, the degree to which countries had made strides in the nutrition transition to a higher fat/higher protein diet did not reduce the significant impact of economic and social globalization on weight and the protein supply in particular did not have an independent impact on weight for either men or women. This suggests additional possible pathways that may contribute to obesity that we were not able to entirely capture in the measures of the nutrition transition. For instance, the measure of social globalization captures the number of McDonalds per capita. We did not specifically measure physical activity levels, which is the counterpart to higher calorie consumption that can lead to overweight. However, we would not necessarily expect globalization per se, apart from economic development to affect physical activity levels.

As hypothesized, women’s labor force participation also positively predicted higher weight in both men and women. This finding across countries parallels findings from individual level research that children of women who work are more likely to be overweight and obese.\textsuperscript{xv,xvi} These studies have found that working women spend significantly less time cooking, eating and playing with their children, and are more likely to purchase prepared foods. A set of similar mechanisms could explain the relationship between women’s labor force participation and higher rates of obesity in both themselves and in men.

While women’s labor force participation predicts both male and female BMI, women’s social rights predict higher BMI in men but not in women. The degree to which women are able to participate fully in social life may influence their overall physical activity levels or influence other norms around women’s appearance.
Levels of obesity vary widely across regions. The countries with the highest rates of obesity include many of the Polynesian Islands. This phenomenon has been written about and previously analyzed. The Polynesia Islands are highly import-dependent, and have increasingly replaced a root based diet with increasing amounts of imported foods such as fatty meats, processed foods, sugar, and refined staples such as rice.\textsuperscript{xvii,xviii} The increase in food import dependence is thought to potentially interact with genetics to lead to strikingly high rates of obesity diet-related disease in the Pacific Islands.\textsuperscript{xix,xx} Other regions with high obesity include countries that comprise the former Soviet Union and Latin America.

**Conclusions**

Using longitudinal dataset of mean body mass index and information on GDP per capita, globalization, and women’s empowerment that covers 170 countries from 1993-2010, we find that both economic and social globalization predict higher BMIs in countries over time. We further find that women’s labor force participation increases mean BMI for men and women, but women’s social empowerment increases men’s mean BMI. Countries should examine further the various social and economic pathways influencing the rise of obesity and the role of international influences.
Table 1: Predictors of National Mean BMI, Men and Women, 1993-2010

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b/ci95</td>
<td>b/ci95</td>
</tr>
<tr>
<td>Economic Globalization</td>
<td>0.01***</td>
<td>0.01***</td>
</tr>
<tr>
<td></td>
<td>[0.01,0.01]</td>
<td>[0.01,0.01]</td>
</tr>
<tr>
<td>Social Globalization</td>
<td>0.02***</td>
<td>0.02***</td>
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<tr>
<td></td>
<td>[0.02,0.03]</td>
<td>[0.02,0.02]</td>
</tr>
<tr>
<td>Real GDP per Capita (1,000 2005US$)</td>
<td>0.01*</td>
<td>0.05***</td>
</tr>
<tr>
<td></td>
<td>[0.00,0.02]</td>
<td>[0.05,0.06]</td>
</tr>
<tr>
<td>Democracy</td>
<td>0.02***</td>
<td>0.01***</td>
</tr>
<tr>
<td></td>
<td>[0.02,0.03]</td>
<td>[0.01,0.02]</td>
</tr>
<tr>
<td>Women's Rights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women's Social Rights</td>
<td>0</td>
<td>0.03**</td>
</tr>
<tr>
<td></td>
<td>[-0.03,0.04]</td>
<td>[0.01,0.05]</td>
</tr>
<tr>
<td>Labor force, female (% of total labor force)</td>
<td>0.08***</td>
<td>0.06***</td>
</tr>
<tr>
<td></td>
<td>[0.07,0.09]</td>
<td>[0.05,0.07]</td>
</tr>
<tr>
<td>Nutrition Transition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food supply (kcal/capita/day)</td>
<td>0.00***</td>
<td>0.00***</td>
</tr>
<tr>
<td></td>
<td>[0.00,0.00]</td>
<td>[0.00,0.00]</td>
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<tr>
<td>fat supply (g/capita/day)</td>
<td>0</td>
<td>0.00***</td>
</tr>
<tr>
<td></td>
<td>[-0.00,0.00]</td>
<td>[0.00,0.01]</td>
</tr>
<tr>
<td>protein supply (g/capita/day)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>[-0.00,0.01]</td>
<td>[-0.00,0.01]</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern Europe and post Soviet Union (Ref)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>[0.00,0.00]</td>
<td>[0.00,0.00]</td>
</tr>
<tr>
<td>Latin America and The Caribbean</td>
<td>1.64***</td>
<td>0.60**</td>
</tr>
<tr>
<td></td>
<td>[1.00,2.29]</td>
<td>[0.19,1.01]</td>
</tr>
<tr>
<td>North Africa &amp; the Middle East</td>
<td>3.58***</td>
<td>1.33***</td>
</tr>
<tr>
<td></td>
<td>[2.79,4.36]</td>
<td>[0.83,1.84]</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>-0.90**</td>
<td>-2.14***</td>
</tr>
<tr>
<td></td>
<td>[-1.48,-0.32]</td>
<td>[-2.51,-1.77]</td>
</tr>
<tr>
<td>Western Europe and North America</td>
<td>-1.82***</td>
<td>-1.48***</td>
</tr>
<tr>
<td></td>
<td>[-2.48,-1.15]</td>
<td>[-1.90,-1.05]</td>
</tr>
<tr>
<td>East and South-East Asia</td>
<td>-2.08***</td>
<td>-2.52***</td>
</tr>
<tr>
<td></td>
<td>[-2.91,-1.26]</td>
<td>[-3.05,-1.99]</td>
</tr>
<tr>
<td>South Asia</td>
<td>-1.62**</td>
<td>-1.96***</td>
</tr>
<tr>
<td></td>
<td>[-2.67,-0.58]</td>
<td>[-2.62,-1.29]</td>
</tr>
</tbody>
</table>
The Pacific 3.22** 0.88
[1.08,5.36] [-0.49,2.25]
_cons 16.80*** 18.86***
[16.10,17.50] [18.40,19.31]
N 1854 1854
Appendix

Figure 1: Conceptual Model

Theoretical Framework: How different Variables might Affect Men's and Women's Obesity

- Modernization Theory
  - Economic Development (GDP per capita)
- Nutrition Transition (move from peasant diet to diet with more meat and prepared foods)
  - Lower rates of physical activity
- Women's Empowerment
  - Social equality with men guaranteed in law
  - Economic equality with men guaranteed in law
  - Political equality with men guaranteed in law
- World System Theory?
  - Globalization
  - Economic Globalization
  - Social Globalization
  - Cultural Globalization

Women participate more equally in household decision-making (including over food)
- More women in workforce (women working and less time to cook, more reliance on prepared foods)
- More women in elected office (more policies to protect women)

Obesity Prevalence (mean BMI)
- Women
- Men

Unfair trade laws - more junk food imported into country
- People want to be more Western, which they equate with eating fast foods
References


iv Popkin, 2008. The World is Fat.

v Judith E. Brown,*, Dorothy H. Broomb, Jan M. Nicholson c, Michael Bittman. Do working mothers raise couch potato kids? Maternal employment and children's lifestyle behaviours and weight in early childhood


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xiv Daniels, Kennedy, Kawachi. Is justice good for our health? Daedalus.


