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Weight and earnings among childbearing women in Metropolitan Cebu, Philippines (1983-2002)

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Abstract

We estimated the relationship between weight status and earnings among women participating in the Cebu Longitudinal Health and Nutrition Surveys between 1983 and 2002 conducted in Cebu, Philippines. Women working for pay were selected for the analysis. We used fixed effects estimation to account for unobserved time invariant characteristics related to weight. After correcting for potential bias due to unobserved heterogeneity, our results suggest that the earnings of obese or overweight women in Cebu (Philippines) were not less than women of normal weight. The relation between earnings and weight exists only among self-employed women or women working in more than one type of activity. No discrimination was found among women working for wages or per piece rate. In contrast, among self-employed and women working in more than one type of activity we found that underweight women earn less than do those with normal weight.

Keywords

Cebu; wages; anthropometry; BMI; obesity; overweight; underweight; development

Introduction

The fall of mortality and rise of life expectancy in the twentieth century has been partly attributed to improvements in nutrition (McKeown 1976). Fogel suggested that these health improvements translated into rapid economic growth in the developed world (Fogel 1994). He hypothesized that surplus energy due to increases in caloric intake resulted in more intense and efficiently worked hours. However, in developed countries with very low prevalence of underweight, the benefits of increases in weight are no longer obtained. Studies in the United States report a negative association between wages and weight among women and non-conclusive findings among men (Atella et al. 2008; Baum and Ford 2004; Cawley et al. 2009; Cawley 2004; Greve 2008; Han et al. 2009; Johansson et al. 2009; Wada and Tekin 2010). A study conducted in nine European countries shows a negative association between wages and weight in the South but a positive correlation in countries located in the North (Brunello and d'Hombres 2007).

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Given the rapid increase of obesity in developing countries where malnutrition is still a high burden (Popkin 1998), one could expect that underweight individuals may still earn lower wages but that the overweight and obese may start to see decreases in productivity and earnings. Low weight individuals are at higher risk of mortality and infectious diseases or they may have become underweight due to the effects of a chronic disease like depression, cancer or AIDS. At high levels of weight increased mortality and morbidity occur due to chronic diseases like diabetes, arthritis and atherosclerosis, which may not manifest fully for several decades (Ezzati et al. 2002). Both extremes may be associated with lower productivity or discrimination from employers fearing higher health costs. However, evidence from less developed countries has shown a positive association between wages and weight (Carba et al. 2009; Deolalikar 1988; Dinda et al. 2006; Paul Schultz 2003; Strauss and Thomas 1998; Thomas and Strauss 1997). The effect of weight on earnings is likely to depend on the cultural norms of a country, the characteristics and patterns of discrimination in the labor market, and the stage of the nutrition transition. Studies in less developed countries where there have been increases in the prevalence of overweight and obesity are needed.

In this paper we estimate the effect of weight on earnings among women participating in the Cebu Longitudinal Health and Nutrition Surveys (CLHNS) between 1983 and 2002 conducted in Cebu, Philippines. Metro Cebu has experienced rapid economic development over the 20 year period studied. This period witnessed increases in female participation in the formal sector of the economy as well as increases in female obesity and overweight (Colchero et al. 2008). Weight and calories may be endogenous if healthy workers are more productive but higher income is invested to improve health. To minimize potential bias due to unobserved heterogeneity we applied fixed effects (FE) estimators to eliminate time invariant characteristics associated with weight and earnings.

Data

The CLHNS is a cohort of woman who gave birth in 1983 in Metro Cebu, the second largest metropolis in Philippines. A single stage cluster sampling design was used to locate all pregnant women from 33 randomly selected barangays, the smallest administrative unit in Cebu (Adair 2001). The surveys contain information on the index child, their mothers, their households and the communities where they lived. From 3,327 pregnant women enrolled at baseline, 345 only completed the baseline survey and others were temporarily absent in some of the rounds¹.

Variables

We used women's real log hourly earnings as the dependent variable. In the CLHNS all members of the household aged 6 or older report their labor force participation, hours worked and income received. Different sources of income, time worked and amount paid are reported in the study. We estimated hourly income among women who receive payments on a regular time basis (wages), per piece rate, from fishing and self-employment activities. Income from livestock activities was excluded because in the first surveys it was aggregated at the household level and each household member's contribution was not reported. Earnings were converted into 2002 prices using consumer price indices from the Philippines. Hourly earnings were log transformed to achieve normality.

In the CLHNS weight was measured to the nearest 0.1kg using portables scales and height was measured to the nearest 0.1 cm using portable stadiometers (Adair 2004)². To model

¹The Cebu Longitudinal Health and Nutrition Surveys can be found at: <http://www.cpc.unc.edu/projects/cebu/>

non-linearities in the relation between earnings and weight, we created four categories of BMI, a standard measure of weight independent of height that is calculated by dividing weight in kilograms over height squared in meters. We used the following classification: underweight (BMI<18.5), normal weight (BMI between 18.5 and 25), overweight (BMI between 25 and 30) and obese (BMI above 30) (World Health Organization 2000). We also modeled BMI as a continuous variable including a quadratic term to test non-linearities. To reduce the potential reverse causality between weight and earnings, we regressed earnings against lagged BMI (BMI classification or value in the previous survey) instead of current BMI classification or value.

Given that baseline measures occurred during pregnancy, weight measured at 6 months postpartum was used as an estimate of women's weight at baseline. Studies on weight retention after pregnancy suggests that weight decreases significantly after 6 and 12 months postpartum (Gunderson and Abrams 2000). For a large group of women in developed countries, weight excess is not greater than 1 to 2 kg after 6 to 12 months postpartum (Gunderson and Abrams 2000). However, about 20% of women had pregnancy excessive weight gain, which is partly attributed to the increase in overweight and obesity (Gunderson and Abrams 2000). Schmitt et al. report that post-partum women in developing countries retain less weight compared to women in developed countries (Schmitt et al. 2007). We acknowledge that there is variability and that few studies have been conducted in developing countries. However, given that the Philippines is a lower income country, it is reasonable to assume that most women recover their baseline weight at 6 months postpartum.

For pregnant women at any survey round, BMI was imputed using information from all women in the sample. To impute BMI values for pregnant women we fitted a linear regression of each woman's current BMI on each woman's previous BMI, previous activity level at occupation, household income, children under five years old in the household, age, period dummies, caloric intake, breastfeeding, parity, car and television ownership and urban/rural residence based on estimations conducted in a different paper (Colchero et al. 2008).

Four work status dummy variables were created: women working for wages, per piece rate, self-employed or women working in more than one type of activity. Occupational categories were included as control variables. Classification was based on the activity that provided the highest income. We grouped occupations in the following 6 categories: professional, managers, clerical, sales, services and production-process, farming and fishing activities. Other variables included in the model were education reported as highest grade completed, age, parity and breastfeeding. Dummy variables for each year of the survey were used to model non-linear period effects on log hourly earnings.

Methods

We estimated the effect of weight on log hourly earnings. The following specification was defined for log hourly earnings over time as a function of weight and other covariates, where i , is a subscript for the individual, t for time, X represents a vector of sociodemographic control variables, α_i represents a set of time invariant characteristics, γ_t symbolizes dummy variables for each year of the survey and u_{it} represents the random disturbance for every unit i in time t .

²We averaged all measures of height in the surveys. For women less than 18, whose stature may still change with time, we used the reported height in each survey but average the first three first measures: baseline and the following two bimonthly surveys in which height was measured.

$$\text{Log}(\text{earnings})_{it} = \beta_0 + \beta_1 \text{weight}_{it} + \beta_2 X_{it} + \gamma_t + \alpha_i + u_{it}$$

In a fixed effects (FE) regression, the unobserved heterogeneity captured in the systematic component α_i is eliminated by subtracting the individual mean over time. FE accounts for unobserved time invariant individual characteristics associated with earnings. We also ran an ordinary least squares (OLS) regression for comparison. Hausman tests were used to compare all models (Hausman 1978).

We modeled the effect of current and lagged BMI classification on log hourly earnings. As in other papers (Averett and Korenman 1996; Cawley 2004) we included in the model more than one lag but did not report all models because only BMI category in the previous survey was statistically significant. For most survey years, the first lag is around 3 years.

We conducted several sensitivity analyses. We first explored a different functional form for BMI using a quadratic term. Secondly, in this model, occupation and source of income were treated as confounders but we acknowledge that in the causal pathway occupation and source of income could be acting as mediators. Women may be selected or self-selected into occupations based on their BMI levels and earnings could vary by type of occupation. In sensitivity analysis we excluded occupation and source of income in the model and compared the results with the specification with those variables. Thirdly, we used a Heckman two-step procedure to correct for the potential self-selection of women into the labor force (Heckman 1979). Only women currently working for pay or who have worked in the last four months are included in the analysis. Some women were not working for pay at the time of the survey or were engaged in family farming or fishing activities. Some women joined the labor force at different points in time. A large majority of these women were not working at study entry since they were pregnant. We included the number of males in the household as an exclusion restriction in the structural equation. We hypothesize that the higher the number of males in the household the lower the probability of women working for pay and we do not expect this variable to be correlated with BMI. Using fixed effects when correcting for sample selection can produce inconsistent estimations (Wooldridge 2002). As suggested by Wooldridge we estimated a probit model of the selection equation for each time period and saved the inverse mills ratio (IMR). We then ran a robust pooled ordinary least squares (OLS) regression using the selected sample and included in the model the IMR interacted with the period dummies. We used robust estimators to correct for heteroskedasticity and serial correlation. Finally, we ran the lagged fixed effect model stratifying by source of income (wages, per piece rate, self-employed).

Results

There are 3,327 women included in the analytical sample who were followed for 6 rounds between 1983 and 2002 (Table 1). Some women temporarily missed some of the surveys or were not included in the sample if they stopped working. At baseline only 36% of women were working for pay. The small percentage who were working at study entry is explained by the fact that all women were pregnant and had delivered within six months after the baseline round. The percentage of women working for pay increased to 72% in 2002. Among the women working at baseline around 49% were self-employed, 33% receiving wages, 15% were working per piece rate and 3% in more than one activity. In 2002, there was a decrease in the percent of women receiving wages and per piece rate and an increase in the percentage of women working in more than one type of activity. Most common occupational activities in 1983 were production, farming and fishing, sales and services. Twenty years later, there is a shift from production related activities to services and sales.

Table 2 presents the relationship between current BMI classification and log hourly earnings using OLS and FE and the effect of lagged BMI classification on log hourly earnings using OLS and FE. Hausman tests indicate that the models are different and favor the use of FE regression over ordinary least squares and random effects models (FE against OLS: $\chi^2=154.8$ p value<0.001, FE against random effects: $\chi^2=76.16$ p value<0.001).

Regular and lagged OLS estimations show significant positive associations between earnings and weight. The coefficients using FE are smaller compared to OLS revealing that time invariant characteristics explain some of the co-variation of earnings and weight. Results are slightly different when comparing regular and lagged FE³. Estimations using current BMI may be biased due to reverse causality, therefore our preferred model is lagged FE.

The lagged FE model reveals that BMI categories and wages have a non-linear relationship. On average, compared to underweight women, hourly earnings among women with normal weight were 8.6% higher. Compared to underweight, overweight women earn 12.7% more (Table 2, column D). Hourly earnings among obese women were 9% higher than that of the underweight but the coefficient was not significant. Lack of significance may be due to small sample size as the prevalence of obesity in this cohort increased over the 20 year period but remained below 7% in the sample (Table 1).

Women working as self-employed or in more than one type of activity earned more than women working on a per piece rate. Log hourly earnings increased with education and age and decreased with parity, although the last two coefficients were not significant. Women who were currently breastfeeding had lower earnings, since women may prefer to work fewer hours or to choose a job with a lower salary if it allows her to take care of her child. However the coefficient for breastfeeding was not significant. Women's real earnings increased over time but not all coefficients for the time period dummy were statistically significant.

All occupations had higher earnings compared to production and fishing or farming activities. We explored interactions between lagged BMI categories and occupations (results not shown). Log hourly earnings among women working as professionals or in sales that have normal weight, overweight or are obese were higher compared to underweight women working in production-process, farming and fishing activities (reference group). The difference in earnings between the reference group and women working in these two occupations increased with weight. A significant difference was also found between obese women working in services and underweight women working in production-process, farming and fishing activities.

We also explored the effect of BMI classification on log hourly earnings stratifying by source of income (Table 3). Results show a significant effect of weight on earning among women working as self-employed and women working in more than one type of activity. The relation between weight and earnings was not significant among women working for wages or in per piece rate.

Sensitivity analysis

Table 4 repeats the models in Table 2 except that instead of the categorical BMI values we enter BMI as a continuous variable in linear and quadratic forms. All regressions show that earnings increased with BMI but at a decreasing rate. The coefficients using FE are not

³Except for normal weight, coefficients for BMI classification in the model with lagged FE were slightly lower compared to regular FE.

significant. In the lagged FE regression, one additional BMI point above the mean (21.7 kg/m²) is associated with a 0.7% increase in earnings; although the coefficient was not significant.

Table 5 presents results from the Heckman selection correction model. The selection equation (results not shown) reveals that one additional male in the household reduces by 3.6% the probability that the women works for pay (p value<0.001). Compared to models presented in Table 2, coefficients using Heckman selection correction are similar except that the difference between overweight and underweight in the FE (current BMI) is significant but only at 10%. The inverse mills ratio was not statistically significant.

Women may be selected or self-selected into occupations based on their BMI levels and earnings could vary by type of occupation. We ran a model excluding occupation and source of income to see how much coefficients for BMI changed (Table 6). The coefficients for BMI categories are slightly lower compared to models in Table 2 and in the lagged FE model they are not statistically significant.

Discussion

We estimated the effect of BMI categories on real log hourly earnings in a cohort of women from Metropolitan Cebu. After correcting for potential bias due to unobserved heterogeneity, our results suggest that the earnings of obese or overweight women in Cebu (Philippines) were not less than those of normal weight. The relationship between earnings and weight was found only among self-employed women or women working in more than one type of activity. No statistically significant discrimination was found among women working for wages or per piece rate. In contrast, among self-employed and women working in more than one type of activity we found that underweight women earn less.

Sensitivity analysis shows that when excluding occupation and source of income from the model, the coefficients for BMI are usually slightly smaller and in the lagged FE estimation are no longer significant. One would expect that one of the ways workers adapt to higher BMI is by changing occupation and job type. In the models shown in Table 2 where occupation is controlled for, the coefficients estimate the relationship between BMI and earnings for workers whose job types and occupations are held statistically fixed. We interpret the smaller coefficients when occupation and job type is excluded for as evidence that workers are indeed changing jobs and occupations to preserve their earnings.

Self-selection of women into the labor force could represent a bias. Only women currently working for pay or who have worked in the last four months are included in the analysis. Some women were not working for pay at the time of the survey or were engaged in family farming or fishing activities. Most of the women were not working at study entry since they were pregnant six months before. However, some were included later if they had joined the labor force in subsequent rounds. We compared basic characteristics of women by their working status at baseline (Appendix 1). On average, the groups were similar in body weight. Statistically significant differences were found in age (one year difference), number of children under five (0.1 difference) and household income. In sensitivity analysis we estimated a Heckman model to correct for a potential selective labor force entry. Heckman corrected estimates negligible differences from uncorrected. Prior to the Heckman-correction exercise one might have worried about positive selection in which only the most productive women at any body size choose to work. This would have biased towards zero our estimates of the impact of BMI on earnings. Another potential bias could be through breastfeeding. There is evidence in this sample that women who work have a lower probability of breastfeeding (Adair et al. 1993; Popkin et al. 1993; Stewart et al. 1991) hence

the working women may have accumulated more weight compared to those who breastfeed and stay at home. Given that we did find effects of BMI on earnings among the self-employed and given that the inverse Mill's ratio was not statistically different from zero, one could infer that the selection problem of only the most productive overweight women choosing to enter the workforce is small. In any case our results offer a lower bound on the absolute magnitude of BMI effects on earnings.

Our study has some limitations. Estimates rely on self-reported income, which can be subject to measurement error. A potential selection bias that was not addressed in this analysis arises if pregnant women enrolled in 1983 are different from the entire female population in Cebu. However, because marriage and marital fertility were nearly universal during the third decade of life of Filipina women during the 1980s, a sample recruited during pregnancy should not be different from the sample of all women. Gultiano shows that women participating in the CLHNS were younger and of higher parity compared to women in urban Metro Cebu (Gultiano 1999). However, no significant differences in household amenities were found (Gultiano 1999). The study concluded that despite the selectivity on age and parity the CLHNS represents a reasonable socioeconomic sample of childbearing women in Metro Cebu. Unless younger women with higher parity were different in unobservable variables other than socioeconomic factors, we believe that the potential bias in our analysis due to the selective enrollment of pregnant women at baseline is low. However, the results from this analysis can only be generalizable to childbearing women. Imputation of BMI for pregnant women could create a bias. However, the number of observations that were imputed represents only 7% of the total observations in the sample along the 7 rounds. We compared the model using imputed values for BMI among pregnant women with a model where the missing observations were excluded. Results were almost identical and the conclusions of the paper did not change.

Drawing inferences about the causal effect of weight on wages could be compromised by reverse causation if higher earnings cause changes in nutrition and exercise that lead to higher weight gain. Our strategy to minimize this potential bias was to lag BMI categories to reduce the effect of current BMI on earnings and use FE regression to control for unobserved time invariant characteristics associated with weight and wages. Ultimately these methods cannot fully control for reverse causation because there could still be correlation between the error term in this period's earnings and body size in the last period. Therefore we recognize that our results could be biased due to lack of control of time variant unobservable characteristics associated with earnings and weight.

Similar to other studies of the CLHNS, attrition in this study was higher among women living in urban areas and with lower education (Adair 2004). No significant differences were found among women lost to follow up in age, weight and height reducing the potential bias in our estimations due attrition. In addition, our study results were robust when controlling for many observable factors associated with attrition.

Our analysis of weight and earnings in Cebu is consistent with a society in transition. Vestiges of the positive relationship between weight and earnings remain for the self-employed. For the growing pool of wage workers we found no relationship between weight and women's earnings. For now, the overall pool of laborers experiences slightly higher earnings for the overweight when controlling for selective labor force entry. As the economy becomes more dominated by wage work, these economic advantages for overweight women could dissipate. More detailed studies of body size and earnings in various occupations are needed.

Our findings show that the positive effect of weight on earnings is seen mainly among women working as self-employed or in more than one type of activity. Piece-rate payment contracts inherently control for unobservable levels of effort of the employee, but with time-based wages an employer would be more motivated to discriminate on the basis of health as proxied by weight. Although we would have expected to see weight based discrimination among women working for wages as compared to those working per piece rate, this pattern did not emerge from the analysis. Instead we see lower earnings for underweight women among the self-employed only. It is unclear whether low earnings caused the weight deficit or vice versa among the self-employed. These findings could be related to the fact that self-employed women or those who work in different activities may need to be stronger to pursue these types of activities. In Cebu the self-employed tend to be engaged in food preparation and street vending. Factors related to weight gained, such as education, may explain more success at selling food or other activities. Higher earnings among these women may have led to overweight and obesity. Hence, reverse causality is quite likely in this group.

Appendix 1

Comparison of basic characteristics between women working for pay and women not working for pay at baseline

Variable	Working	Not working
Number of women	1,227	2,100
Body Mass Index (kg/m ²)	20.6 (2.8)	20.5 (2.3)
Age	26.7 (6.2)**	25.7 (5.8)**
Highest grade completed	7.6 (3.5)	7.5 (3.5)
Pregnant	0.02 (0.1)	0.01 (0.1)
Children under five	1.3 (1.0)*	1.4 (1.0)*
Urban residence	0.77 (0.4)	0.76 (0.4)
Household owing a car	0.008 (0.002)	0.007 (0.002)
Household income per thousand (2002 pesos)	96.5 (163.2)*	80.9 (188.8)*

* Difference significant at 5%,

** significant at 1%,

+ significant at 0.1, two sample t test with equal variances

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- The relation between earnings and weight exists only among self-employed women or women working in more than one type of activity.
- No discrimination was found among women working for wages or per piece rate. In contrast, among self-employed and women working in more than one type of activity we found that underweight women earn less.

Table 1

Characteristics of women participating in the Cebu Longitudinal Health and Nutrition Surveys in 1983 and 2002

Variable	1983		2002	
	Mean or %	SD	Mean or %	SD
Log hourly earnings (2002 Filipino pesos)	2.62	1.03	3.17	1.06
Hourly earnings (2002 Filipino pesos)	22.81	40.57	58.13	291.44
Working for pay	0.36	0.48	0.72	0.44
BMI categories				
Underweight (BMI<18.5)	19.27%		9.32%	
Normal weight BMI (18.5-25)	74.36%		56.42%	
Overweight (BMI 25-30)	5.75%		27.59%	
Obese (BMI>30)	0.62%		6.66%	
Age	26.03	5.97	45.15	6.15
Education (highest grade completed)	7.57	3.72	7.29	3.82
Parity	2.73	2.21	6.43	2.21
Number of children under 5 years old	1.34	1.03	0.58	0.89
Source of income	%		%	
Wages	33.5%		27.5%	
Piece rate	14.8%		10.0%	
Self-employed	48.9%		49.8%	
More than one type of activity	2.8%		12.7%	
Occupation	%		%	
Professional	4.2%		4.1%	
Managers	0.2%		4.5%	
Clerical	5.6%		2.8%	
Service	13.3%		18.6%	
Sales	33.5%		41.9%	
Production, farming and fishing	43.2%		28.1%	

1 Philippine peso = 0.0196 dollars in 2002

Table 2

Effect of body mass index classification on real log hourly earnings in the Cebu Longitudinal Health and Nutrition Surveys working for pay between 1983 and 2002

Column	A	B	C	D
Variable	Regular OLS	Lagged OLS	Regular FE	Lagged FE
<i>Underweight</i>	<i>Reference group</i>	<i>Reference group</i>	<i>Reference group</i>	<i>Reference group</i>
Normal weight	0.123**	0.134**	0.063	0.087*
Overweight	0.226**	0.237**	0.139*	0.127*
Obese	0.271**	0.227**	0.166*	0.09
Age	-0.004*	-0.005**	0.005	0.011
Current pregnancy	-0.058	-0.039	-0.12**	-0.117**
Per piece rate,	<i>Reference group</i>	<i>Reference group</i>	<i>Reference group</i>	<i>Reference group</i>
Wages	0.068 ⁺	0.075*	-0.019	-0.005
Self-employed	0.436**	0.425**	0.228**	0.22**
More than one type of activity	1.309**	1.297**	1.153**	1.147**
Education	0.045**	0.046**	0.033 ⁺	0.039*
<i>Production process, farming and fishing</i>	<i>Reference group</i>	<i>Reference group</i>	<i>Reference group</i>	<i>Reference group</i>
Professional	0.649**	0.637**	0.166 ⁺	0.191 ⁺
Managers	0.799**	0.811**	0.676**	0.698**
Clerical	0.549**	0.56**	0.254**	0.324**
Services	0.201**	0.198**	0.164**	0.167**
Sales	0.016	0.043	0.01	0.022
Parity	-0.002	-0.003	-0.016	-0.014
Breastfeeding	-0.003	-0.024	-0.01	-0.009
<i>1984 (time dummy)</i>	<i>Reference group</i>	<i>Reference group</i>	<i>Reference group</i>	<i>Reference group</i>
1985	-0.101**	-0.073 ⁺	-0.096*	-0.095*
1991	0.166**	0.232**	0.189	0.167
1994	0.459**	0.497**	0.451*	0.399 ⁺
1999	0.433**	0.481**	0.402	0.327
2002	0.432**	0.487**	0.403	0.312
Constant	1.907**	1.92**	2.018**	1.773**
Observations	9174	8177	9174	8177
R-squared	0.28	0.28	0.24	0.24

** significant at 1%,

* significant at 5%,

⁺ significant at 10%

Underweight: BMI<18.5, Normal weight: BMI 18.5-25, Overweight: BMI 25-30, Obese: BMI>30. In the OLS and FE lagged models the lagged variable is BMI classification.

Table 3

Effect of body mass index on real log hourly earnings in the Cebu Longitudinal Health and Nutrition Surveys working for pay between 1983 and 2002 by source of income lagged fixed effects

Variable	Wage workers	Per piece workers	Self-employed workers	More than one type of activity
<i>Underweight</i>			<i>Reference group</i>	
Normal weight	-0.004	-0.073	0.216**	0.494*
Overweight (BMI 25-30)	0.007	0.026	0.303**	0.540 ⁺
Obese (BMI>30)	-0.018	-0.349	0.330*	1.244*
Observations	2,239	1,186	4,009	743

** significant at 1%,

* significant at 5%,

⁺ significant at 10%.

Same covariates used as in Table 2

Table 4

Effect of body mass index on real log hourly earnings in the Cebu Longitudinal Health and Nutrition Surveys working for pay between 1983 and 2002 quadratic term for BMI

Variable	Regular OLS	Lagged OLS	Regular FE	Lagged FE
BMI	0.022	0.076**	0.01	0.04
BMI squared	0	-0.001**	0	-0.001
BMI squared (marginal effect)	0.018**	0.022**	0.0126*	0.007

** significant at 1%,

* significant at 5%,

+ significant at 10%.

Same covariates used as in Table 2.

^a Marginal effect for the quadratic term was computed using mean BMI.

Table 5

Effect of body mass index on real log hourly earnings in the Cebu Longitudinal Health and Nutrition Surveys working for pay between 1983 and 2002 Heckman Selection Correction Model

Variable	Regular OLS	Lagged OLS	Regular FE	Lagged FE
<i>Underweight</i>				
Normal weight	0.118**	0.133**	0.054	0.081*
Overweight	0.220**	0.232**	0.106 ⁺	0.110 ⁺
Obese	0.260**	0.219**	0.141	0.066
Inverse Mills Ratio	-0.070	-0.068	-0.225	-0.229

** significant at 1%,

* significant at 5%,

⁺ significant at 10%.

Same covariates used as in Table 2.

Table 6

Effect of body mass index on real log hourly earnings in the Cebu Longitudinal Health and Nutrition Surveys working for pay between 1983 and 2002 excluding occupation and source of income

Variable	Regular OLS	Lagged OLS	Regular FE	Lagged FE
<i>Underweight</i>		<i>Reference group</i>		
Normal weight	0.144**	0.151**	0.062	0.060
Overweight (BMI 25-30)	0.279**	0.286**	0.145*	0.084
Obese (BMI>30)	0.351**	0.312**	0.154	0.036

** significant at 1%,

* significant at 5%,

+ significant at 10%.

Same covariates used as in Table 2 except for occupation and source of income