

The Effects of Reproductive Factors on Weight Gain and Obesity Across Age Cohorts in Metro Cebu, Philippines

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Heart disease is one of the foremost causes of mortality worldwide. In Asia and in the Philippines, cardiovascular disease prevalence and mortality trends have been rising for the past several decades. The Philippines has the highest death rate for hypertension in the region (<http://www2.doh.gov.ph>).

Obesity is identified as one of the risk factors that may predispose a person to develop heart disease. It increases the risk of many diseases and health conditions such as hypertension and diabetes. Any level of overweight increases heart disease risk and the greater the degree of overweight, the greater the probability that heart disease will develop. Even in the absence of other risk factors, those who are obese are the most likely to develop heart disease. A recent study that examined more than 100,000 women age 30 to 55 showed that the risk for heart disease was more than three times higher among the most obese group than among the leanest (Black).

According to the World Health Organization (WHO) in 2004, obesity has rapidly reached the status of a global epidemic. Of the more than 1 billion overweight adults globally, at least 300 million of them are obese (<http://www.who.int/dietphysicalactivity>). In the Philippines, a growing proportion of the population has become overweight and/or obese. Among adult women alone, overweight prevalence increased from 18% to 23% in 1998. (FNRI 2001). In CLHNS mothers, from 1986 to 2002, the prevalence of overweight (BMI between 25 and 30 kg/m²) increased from 5.95 to 32.4%, and obesity (BMI >30) increased from 0.5% to 9.3%. (Adair, 2004).

Some studies have examined factors associated with overweight and/or obesity. Lahmann et al (2000) investigated the association between sociodemographic factors and long-term weight gain, current body fatness and central adiposity in Swedish women. The study observed a large weight gain and a high rate of obesity during adult life. Initial BMI, smoking, age, physical activity and early socioeconomic status accounted for most of the variance in weight change, current waist circumference, WHR, and percentage body fat. Another study (Coitinho et al. 2001) found that weight change associated to reproduction was highly dependent on BMI previous to pregnancy and the effects of parity and lactation were small. Li et al (2003) looked at the associations between prenatal and postnatal growth and adult body size and composition. Hardy (2007) observed an increase with mean BMI with increasing number of children in women from 27.4 kg/m² in those with one child to 28.6 kg/m² in those with four or more children. Bjorkelund et al (1996) found out that parity was positively associated to total as well as central obesity, and lactation time was positively associated to abdominal fat cell diameter. Jafar (year) observed that some factors independently and significantly associated with overweight and obesity included greater age, being female, urban residence, being literate and having a high economic status and high intake of meat.

Knowing the negative effects of obesity on the quality of life, there is a great need to study the determinants of obesity to find strategies to stop the emerging epidemic. In the Philippines, longitudinal studies on obesity and reproductive factors is scarce and none had ever done a study on the relationship of reproductive factors and obesity by age cohort.

This study has the following objectives: 1) to look at the prevalence of obesity among women overtime, 2) to present a profile of the obese women in terms of their sociodemographic and reproductive characteristics, and 3) to examine the relationship between the reproductive factors and obesity by age cohort.

Data and Methods

This study uses data from the Cebu Longitudinal Health and Nutrition Survey (CLHNS). The CLHNS is a community-based survey conducted in 17 urban and 16 rural barangays in Metropolitan Cebu, Philippines. A cohort of women who had given birth between May 1983 to April 1984 were followed up since the baseline survey in 1983 when the women were in their third trimester of pregnancy. Follow-up surveys were then conducted when the women gave birth and 17 times thereafter, the most recent in 2005.

Of the 3327 mothers who were interviewed at baseline, 2018 were interviewed in 2005. Some 39% were attrited because of outmigration and less others due to mortality, refusal or unavailability.

Since the study examines change in women's weight overtime, the analysis sample for this study are those women with complete interviews in all of the survey rounds in 1983, 1991, 1998, and 2005. Of the 2018 CLHNS participants who were interviewed in 2005, 349 were excluded because of missing interviews leaving 1669 women for analysis.

Key Variables

Body mass index (BMI) category is the outcome of interest. The prevalence of overweight and obesity is commonly assessed by using (BMI), defined as the weight in kilograms divided by the square of the height in meters (kg/m^2). A BMI over $25 \text{ kg}/\text{m}^2$ is defined as overweight, and a BMI of over $30 \text{ kg}/\text{m}^2$ as obese. For this study, BMI is a three-level categorical variable: 1) healthy weight (BMI of <25.0), 2) overweight (BMI of 25.0 to 29.9), and 3) obese (BMI ≥ 30.0). Height and weight measurements were taken of the women at each survey round.

The main exposure of interest are reproductive variables: 1) parity defined as the total number of pregnancies and 2) age at menarche. Early menarche is clearly associated with degree of overweight, with a twofold increase in rate of early menarche associated with BMI greater than the 85th percentile.

Other variables considered as covariates are age cohort, smoking status, highest education completed, residence location and socioeconomic status. Age cohort is based

on the women's age at baseline categorized into the following groups: less than 20 years old, 20 to 25 years old, 26 to 30 years old, and greater than 35 years old.

Statistical analysis

STATA is used in the preliminary analysis and will be used in further analysis using the appropriate analysis tool.

Results

Preliminary analysis is initially done using descriptive statistics. Table 1 shows the mean values of the characteristics of the women in the sample. Mean BMI has increased from 20.70 in the initial survey in 1983 to 24.34 in the 2005 survey. Weight and assets also increased with age. Mean age at menarche is 14 years while about 38% is experiencing menopause in 2005.

Table 1. Characteristics of sample women, by survey round.

Characteristics	1983 survey	1991 survey	1998 survey	2005 survey
Age	26.55	35.47	42.44	48.36
BMI	20.70	22.91	23.64	24.34
Assets	2.49	3.86	4.64	5.22
Weight (in kg)	46.94	52.19	53.76	55.25
Height (in cm)	150.53	-	-	-
Parity	2.23	.	.	6.5
Age at menarche	13.97	.	.	.
Menopause	.	.	.	38.11

Table 2 shows the increase of overweight and obesity prevalence in women from 5.8% and .55% to 32.65 and 9.7% respectively between 1983 and 2005.

Table 2. BMI status of sample women, by survey round.

BMI Status	1983 survey	1991 survey	1998 survey	2005 survey
Healthy (<25)	93.61	75.00	64.89	57.66
Overweight (25-29)	5.84	20.31	28.09	32.65
Obese (>30)	.55	4.69	7.02	9.69

(Further analysis will be done to answer the objectives of the study.)

References:

Adair LS. 2004. Dramatic rise in overweight and obesity in adult Filipino women and risk of hypertension. *Obesity Research*. 12:1335-41.

Bjorkelund C, Lissner L, Andersson S, Lapidus L, Bengtsson C. 1996. Reproductive history in relation to relative weight and fat distribution. *International Journal of Obesity and Related Metabolic Disorders*. 20(3):213-9.

Black, Henry. Cardiovascular risk factors.

Coitinho, Denise, Rosely Sichieri, and Maria Helena D'Aquino Benicio. 2001. Obesity and weight change related to parity and breastfeeding among parous women in Brazil. *Public Health Nutrition*. 4:865-870

Hardy R, DA Lawlor, S Black, MEJ Wadsworth, D Kuh. 2007. Number of children and coronary heart disease risk factors in men and women from a British birth cohort. Volume 114 Issue 6, Pages 721-730. Published on line: 16 May 2007

Jafar, Tazeen H, Nish Chatuverdi and Gregory Pappas. Prevalence of overweight and obesity and their association with hypertension and diabetes mellitus in an Indo-Asian Population.

Lahmann PH, Lissner L, Gullberg B and Berglund G. 2000. Sociodemographic factors associated with long-term weight gain, current body fatness and central adiposity in Swedish women. *International Journal of Obesity*., Volume 24, Number 6, pages 685-694.

Li H, Stein AD, Barnhart HX, Ramakrisnan U, Martorell R. 2003. Associations between prenatal and postnatal growth and adult body size and composition. *American Journal of Clinical Nutrition*. 77:1498-505

Philippine Nutrition Facts and Figures 2001. *Food and Nutrition Research Institute (FNRI), Department of Science and Technology*. UNICEF. ISSN 1655-2911.

World Health Organization. 2004. Global Strategy on diet, physical activity and health: obesity and overweight.