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How Individuals' Birth Weight and Later Risk Factors Interact to Determine Their Risk of Cardiovascular Disease: A Longitudinal Study in the Philippines

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How individuals' birth weight and later risk factors interact to determine their risk of cardiovascular disease: A longitudinal study in the Philippines

Marjorie Pajaron, Ph.D.
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Abstract

Cardiovascular diseases (CVDs), which are disorders of the heart and blood vessels, are the world's leading cause of death (WHO, 2016). The transition from infectious diseases to non-communicable diseases (NCDs), primarily CVDs, as the primary cause of mortality and morbidity worldwide— combined with the economic burden associated with heart-related diseases—prompted the World Health Organization (WHO) and its regional offices to identify CVDs' risk factors (WHO, 2016). This paper examines these risk factors with a focus on the fetal environment and its interaction with adult body mass index (BMI), using longitudinal data from the Cebu Longitudinal Health and Nutrition Survey (CLHNS).

Using a Cox proportional hazards model to estimate hazard ratios adjusted for age and risk factors in adulthood, such as cigarette smoking, the results suggest that there is a positive association between birth weight and heart disease. In addition, when birth weight is interacted with BMI, raised blood pressure is found to be higher among those who were bigger infants at birth and grew to be lighter adults, suggesting centile crossing. Probit models are also used for sensitivity analysis, and the results are consistent with those of the hazards model. Other factors such as adult obesity and a smoking habit are also positively associated with hypertension and CVD.

Keywords: Fetal origins hypothesis, CLHNS, hazards model, CVD, adult risk factors

1. Introduction

Cardiovascular diseases (CVDs), which are disorders of the heart and blood vessels, are the world's leading cause of death (WHO, 2016). In fact, about 17.5 million people die each year from CVDs (mainly due to heart attacks and strokes), which represents approximately 31 per cent of all deaths worldwide. The World Health Organization (WHO) further reports that 75 per cent of these CVD deaths occur in low- and middle-income countries such as the Philippines, where 33 per cent of the total deaths in 2014 were due to CVDs.

The economic burden of disease is higher among low-income families, whose resources are already constrained and insufficient to finance the direct costs (e.g. medicines and hospital costs) associated with the disease. Individuals who suffer from CVDs, as with other non-communicable diseases (NCDs), may experience reduced productivity and may opt for early retirement, which could affect the economy as a whole by restricting labor supply and economic growth (Bloom et al., 2013). In addition, greater longevity has made clinical care for CVDs longer and costlier. Bloom et al. (2013) estimated the cumulative lost economic output from five specific NCDs for the period 2012–2030 for China and India and found that for China, heart-related diseases (cerebrovascular and ischemic heart disease) are responsible for about USD 6.2 trillion in losses (30 per cent of the overall lost output), while the output loss for India for similar heart diseases amounts to approximately USD 1.7 trillion.

The transition from infectious diseases to NCDs, primarily CVDs, as the primary cause of mortality and morbidity worldwide, combined with the economic burden associated with heart-related diseases, prompted WHO and its regional offices such as the South-East Asia WHO Regional Office (SEARO) to identify their risk factors and shift the attention from costly tertiary care to primary and secondary prevention (WHO, 2016). These risk factors include tobacco smoking, harmful alcohol use, physical inactivity and obesity, raised cholesterol and raised blood pressure. In addition, Rich-Edwards et al. (2005), using data in the United States, found that lower birth weight, especially when interacted with adult body mass index (BMI), could lead to higher chances of CVDs.

The goal of this paper is to examine the role of the fetal environment and its interaction with adult BMI in determining the hazard ratio of acquiring CVDs, using longitudinal data from the Cebu Longitudinal Health and Nutrition Survey (CLHNS), which tracks mothers and their children from 1983. This research also aims to examine other adult risk factors and diseases such as respiratory illnesses (tuberculosis, TB), hypertension and diabetes among index children and their mothers.

This paper contributes to the framework set by the fetal origins hypothesis and provides a nuanced understanding of the impact of adult risk factors on the probability of developing CVDs. It does so in the following ways. First, to the best of the author's knowledge, this is the first study to analyze the risk of coronary heart disease faced by mothers and their children using data on their birth weight, BMI and lifestyle for 26 years in the Philippine context. Second, it examines the interaction of birth weight and adult BMI to provide a nuanced understanding of the risks associated with CVDs.

Using the Cox proportional hazards model to estimate hazard ratios adjusted for age and risk factors in adulthood such as cigarette smoking, the results suggest that there is a positive association between birth weight and heart disease. In addition, when birth weight is interacted with BMI, raised blood pressure is found to be higher among those who were bigger infants at birth and grew to be lighter adults, suggesting centile crossing. Probit models are also used for sensitivity analysis and the results are consistent with those of the hazards model. Other factors such as adult obesity and smoking habits are also positively associated with hypertension and CVD.

The paper is organized as follows. Section 2 presents a brief review of relevant literature. Section 3 discusses how the data were prepared, and the methodology used. Section 4 presents research results. Section 5 concludes.

2. Review of related literature

The positive link between BMI and adult health risks, especially heart-related illnesses, is intuitive. Several recent studies on adult health have gone further back in individuals' life cycles to focus on the intra-uterine environment and its potential link to adult diseases. This approach was introduced by Barker (1990), who argued that the 'womb may be more important than the home', that is, the fetal environment and infant life have long-term implications for health, and so it is worth looking further back than even adverse childhood conditions. In particular, the lower the birth weight, a measure used for the fetal environment, the higher the odds of having coronary heart disease, type 2 diabetes and hypertension, as outlined in Barker et al. (2002) and Forsen et al. (1999) in Finland;

Iliadou, Cnattingius, & Lichtenstein (2004) in Sweden; Osler et al. (2009) in Denmark; and Victora et al. (2008) in Brazil, Guatemala, India, the Philippines and South Africa.

On the other hand, higher birth weight is positively correlated with the incidence of cancer as found by the studies of Victora et al. (2008) and Risnes et al. (2010). The relationship between birth weight and adult health outcomes, such as mortality, can also be nonlinear such as in Baker, Olsen, & Sørensen (2008). Using a school-based cohort of men and women in Denmark from 1936 through 1979, Baker, Olsen, & Sørensen (2008) found a U-shaped link between birth weight and adult mortality regardless of gender.

In the Philippine context, similar relationships are also observed (Adair & Cole, 2003; Adair et al., 2009; Norris et al., 2012). Adair & Cole (2003); in particular, studies that used the CLHNS found that a significant increase in birth weight, controlling for current BMI, decreases the odds of high blood pressure among men. Adair et al. (2009) and Norris et al. (2012), which used CLHNS and four other cohort studies in Brazil, Guatemala, India and South Africa, found that greater weight gain over the years is positively related to elevated blood pressure, and lower birth weight followed by hastened weight gain leads to greater risk of having diabetes, respectively, with no distinction by adult gender.

Kuzawa (2004) and Kuzawa & Adair (2004), who used a supply-demand model of fetal nutritional sufficiency, found a significant relationship between fetal condition and cardiovascular risk among males. A more recent work by Bollen, Bauldry, & Adair (2014), using a second-order measurement model other than birth weight, also found that fetal conditions have implications on later adult health. Particularly, they found that the

corresponding factor score of birth weight, birth length and gestational age are negatively associated with systolic blood pressure.

This research has significant implications for health interventions. In particular, it would support an argument for re-allocating health-care resources from curative (curing the sick adult) to preventive (ensuring good health at birth and early-childhood health) efforts (Almond and Currie, 2011).

Rich-Edwards et al. (2005) studied a cohort of American women and tested the fetal hypothesis, that is, they examined the effect of birth weight, interacted with adult BMI, on coronary heart disease and stroke. They found that the odds of having a coronary heart disease is high among women who have low birth weight and have high adult BMI. In a more recent study, Lagerros et al. (2012) found that the risk of having gestational diabetes, which is a key predictor for Type 2 diabetes, is heightened for individuals whose mother was obese at their birth, or who had a low or high birth weight for their gestational age.

As in Rich-Edwards et al. (2005), our study will try to explore the correlation of infant environment, adult nutrition and adult health in mothers using a longitudinal data from Cebu (CLHNS). In particular, this paper aims to contribute to the studies on the correlation between the nutrition of infants and their later adult health. To the best of my knowledge, this research will be the first to use this panel data to examine the hazard ratios of mothers in Metropolitan Cebu over the years and their child's health risk as they grow old. This paper will also try to determine the impact of the interaction of birth weight and BMI on the hazard ratio of children.

3. Data and methodology

3.1 Data preparation

Data from the Cebu Longitudinal Health and Nutrition Survey (CLHNS) for the years 1983 to 2005 will be used to construct a panel data for mothers and their children. CLHNS is a community-based survey that monitors and tracks birth cohorts and their mothers from year 1983 to 2009. The participants in the survey came from 13 randomly selected barangays, 17 urban and 16 rural, of Metropolitan Cebu. Only women who gave birth between May 1, 1983, and April 30, 1984, were enrolled in the survey. The baseline survey had a total of 3,327 women. Seven follow-up surveys were then conducted for the index child (namely the 1991–1992, 1994–1995, 1998–1999, 2002, 2005, 2007 and 2009 surveys), and six for the mothers (who were not interviewed in 2009).

3.1.1 *Dependent variables*

A. Mother-level panel data

For the dependent variables related to mothers, a discrete variable for heart disease (*mheartd_cl*) was generated as well as the year of the onset of the heart disease (*yrheartd_cl*). The incidence and onset of diabetes (*mdiabet_cl* and *yrdiabet_cl*) and TB (*mtuberc_cl* and *yrtuberc_cl*) among mothers were also identified. In the 1991 survey, a mother's hospitalization due to hypertension/hypotension (*mhyper_hosp_cl)* was also identified and the time a mother was first hospitalized due to the same sickness (*mhyper_hosp_time*).

In the 1994 survey, a dummy variable that captures hypertension or high blood pressure was used as well as the onset of the illness (*mCVD_ill_cl* and

mCVD_ill_time_cl, respectively). For the survey years 1998, 2002 and 2005, the data now explicitly differentiated hypertension from other illnesses. The dummies generated are equal to unity if the mother had hypertension since the last survey year (*mhyper_cl*); the onset of hypertension was also included (*mhyper_time_cl*).

B. Child-level panel data

In 1991, the dummy variable capturing the incidence of TB (*ctuberc_cl*) and its onset (*yrtuberc_cl*) were included in the model. In 1994, children who were hospitalized due to TB (*ctuberc_hosp2_cl*) and the time of hospitalization (*ctuberc_hosp_time_cl*) were generated. There were no variables capturing TB in 1998, while for 2002–2009, TB was grouped together with other respiratory ailments such as bronchitis and pulmonary diseases (*crespi_cl*). Hospitalization due to any of these respiratory ailments (*crespi_hosp_cl*) was also included in the model.

As in the mother-level panel data, variables capturing the incidence of heart disease and hospitalization (*cheartd_hosp*) and time of hospitalization (*cheartd_hosp2_time_cl*) due to this illness were also included. Starting with survey years 1998 to 2009, a binary variable (*cheartd2_cl*), equal to unity if the child had heart disease as a chronic illness at the time of the survey, was included. The corresponding variable capturing the time the child had the disease (*cheartd_time_cl*) were only observed for survey years 2002, 2005 and 2009. Children who had cardiovascular ailments (e.g. heart problems, hypertension) as of the last survey were captured by the dummy variable *cCVD2_cl*. The dummy variable *cCVD_hosp2_cl* was generated, which equals unity if

the child was hospitalized due to cardiovascular ailments for survey years 2002 to 2009 only.

A separate dummy variable was generated in the 2009 survey which captured the incidence of hypertension and the corresponding onset of the illness, that is, *chyper2_cl* and *chyper_time_cl*, respectively. Diabetes incidence data started only in the survey year 2002 and are also included in the analysis (*cdiabet2_cl*). Children who were hospitalized due to diabetes was captured by the dummy variable, *cdiabet_hosp*.

3.1.2 Independent variables

A. Mother-level panel data

1. Risk factors for mother-level panel data

A mother's BMI is computed by dividing the mother's weight in kilograms by the square of her height in meters (BMI = kg/m^2). Using the definition of WHO, the BMI is categorized into five classes: underweight with BMI <18.5, normal for those ≥18.5 but less than 25.0, overweight for those ≥25.0 but less than 30.0, obese class I for those ≥30.0 but less than 35, obese class II for those ≥35 but less than 40 and obese class III for those whose BMI exceeds 40. Obesity dummy (*obese2_cl*) for both mothers and children were generated for those with BMI ≥30.0.

A dummy variable capturing whether the mother is smoking or not is included but only for survey years 1983, 2002 and 2005, since survey years 1991, 1994 and 1998 do not contain information on the mother's smoking. Three dummy variables for smoking were generated: (1) daily, with no distinction regarding the extent of consumption

(*msmokes_cl*); (2) at least one cigarette a day (*msmokes_daily_cl*) and (3) had stopped smoking as of the survey year (*msmoke_quit_cl*).

A dummy for alcohol consumption was also generated for mothers. In 1983, a dummy variable for alcohol intake was included, which captures mothers who consumed at least 15 millilitres (ml) of alcohol on a daily basis during pregnancy (*malcohol_daily2_cl*). Another dummy capturing mothers who drank alcoholic beverages during their pregnancy was incorporated into the model (*malcohol2_cl*). For 2002 and 2005, an additional dummy for alcohol consumption, which captures whether the mother stopped drinking alcoholic beverages by the year of survey (*malcohol_quit_cl*), was included. A variable that captures the kind of alcoholic beverages a mother usually consumes (*malcohol2_kind_cl*) and the kind of alcoholic beverages consumed by mothers who drink daily, which also captures mothers whose usual intake of alcohol is at least 15 ml (*malcohol_daily2_kind_cl*), are included.

A mother's blood pressure was considered as a risk factor of certain illnesses. A dummy variable was generated, which equals unity if the mother has high blood pressure (*highBP2_cl*), defined by the American Heart Association as having systolic mm Hg equal to 140 and higher or diastolic mm Hg equal to 90 and higher. Although this variable was considered a risk factor, it was also made the dependent variable in the regressions.

2. Controls for mother-level panel data

As control variables for the regressions, the following are generated: (1) mother's age measured (*mage_cl*); (2) household size (*hhsize_cl*); (3) household proportions based on

gender and age (categorized into less than 1 year old, 1–6 years old, 7–14 years old, 15–24 years old, 25–59 years old, and 60 years old and above); (4) urbanity (*urban_cl*); (5) gender of the household head (*genderhh_cl*) and (6) mother's highest educational attainment (no grade completed, primary, secondary, tertiary and post-graduate).

B. Child-level panel data

1. Risk factors for child-level panel data

Survey years 2007 and 2009 collected no data for children's height, so the heights recorded in 2005 were used instead. Just as with the mother-level panel data, BMI categories for the index child for survey years 2002 to 2009 were generated. The obesity variable was also generated to capture index children who were obese as of the survey year interview (*cobese2_cl*).

For smoking, three dummy variables were generated starting with survey year 2002 as the data allow: (1) whether the child had ever smoked (*csmoke_cl*); (2) whether the child smoked at least one cigarette daily (*csmoke_daily_cl*) and (3) whether the child had stopped smoking by the time of the survey (*csmoke_quit_cl*). A dummy variable for the child's age upon first smoking was also created (*csmoke_age_cl*).

Alcohol data for the index child were also available, but only from the survey year 2002. There were three dummy variables generated: (1) whether the child had ever drunk alcoholic beverages (*calcohol_cl*); (2) whether the child drank daily (*calcohol_daily_cl*) and (3) whether the child had already stopped drinking as of the time of the survey (*calcohol_quit_cl*). Just like the smoking variables, the age at which the index child first tried drinking (*calcohol_age_cl*) was also identified in the panel. As with

the mother-level panel data, a dummy variable for high blood pressure was also generated (*chighBP2_cl*).

Birth weight variables for the index children were taken from survey year 1983. Following Rich-Edwards et al. (2005), birth weight was categorized as follows: <2,268 grams (g), >2,268 g to 2,495 g, >2,495 g to 3,175 g, >3,175 g to 3,856 g, >3,856 g to 4,536 g, and >4,536 g, denoted as *birthwgt_categ_cl*. Other categories generated for birth weight are presented in Table 2c.

2. Controls for child-level panel data

The controls for the index child's panel data were identical to those of the mother-level panel data: age, 12 age- and gender-specific proportion variables, urbanity and highest educational attainment.

3.2 *Data description*

3.2.1. *Dependent variables*

A. Descriptive statistics for mother

Table 1a depicts the reported illnesses of mothers in years 1991, 1994, 1998, 2002 and 2005. Out of 2,394 mothers in 1991, about 4 per cent reported having heart disease and about 1 per cent reported having diabetes or TB. Among those who had been hospitalized since the baseline survey year 1983, only about 0.4 per cent hospital visits had been caused by hypertension.

As of the 1994 survey of 2,776 mothers, 6 per cent had heart disease, 2 per cent had diabetes and only about 0.7 per cent had TB. We note also that 4.7 per cent of the mothers had CVD ailments.

By the year 1998, with 1,985 mothers, 8.9 per cent had heart disease, around 2 per cent had diabetes and only 0.7 per cent reported having TB. We further note that during this survey year, 11.9 per cent of mothers had hypertension.

As of the survey year 2002, with 2,099 mothers, 8.9 per cent suffered from heart disease, 3.4 per cent had diabetes, only about 1 per cent reported the incidence of TB, and the percentage of those with hypertension increased to 16.2 per cent.

By the year 2005, with 2,010 mothers, about 8 per cent reported that they had heart disease, about 5 per cent had diabetes and less than 1 per cent had TB. It is during this survey year also that 19.1 per cent of mothers reported having hypertension.

B. Descriptive statistics for index child

In Table 1b, we report illnesses the index children suffered from 1991 to 2009. In 1991, 1.1 per cent of 2,264 index children reported that they suffered from TB.

By survey year 1994, out of the 2,199 index children who were hospitalized, about 0.05 per cent reported that it was due to TB and 0.05 per cent due to heart disease. In the 1998 survey year with 2,089 index children, only 0.1 per cent had heart disease and a CVD ailment.

In 2002, out of the 2,040 index children, around 26 per cent had respiratory ailments, 0.2 per cent had heart disease, 0.3 per cent had cardiovascular ailments, 0.1 per cent had diabetes and 0.05 per cent had chronic diabetes. During the same year, out of the 1,315 index children who were hospitalized, around 1 per cent was due to a respiratory ailment and only 0.08 per cent due to cardiovascular ailments and diabetes.

In the 2005 survey year, out of the 1,904 index children, 11.4 per cent reported incidence of respiratory ailments, 0.1 per cent of heart disease, 0.3 per cent of cardiovascular ailments and 0.1 per cent of diabetes. For the 589 who had been hospitalized, about 2.6 per cent of hospital visits were due to respiratory ailments and only 0.3 per cent due to cardiovascular ailments.

By the following survey year, 2007, out of the 1,825 index children, those who suffered from respiratory ailments increased to 14.4 per cent and those with cardiovascular ailments and diabetes also increased to 0.8 per cent and 0.2 per cent, respectively. Among the 941 index children who were hospitalized, about 1.5 per cent of hospital visits were due to respiratory ailments, 0.3 per cent due to cardiovascular ailments and 0.1 per cent due to diabetes.

As of the 2009 follow-up survey, of 1,720 index children, about 52 per cent were suffering from respiratory ailments, 0.5 per cent from heart disease, 0.4 per cent from hypertension and 0.5 per cent from diabetes. Among those who had been hospitalized (1,405), 0.6 per cent of hospital visits had been due to respiratory ailments, around 0.3 per cent due to cardiovascular ailments and about 0.1 per cent due to diabetes.

3.2.2. *Independent variables*

A. Independent variables for mother regression

In Table 2a, we show the characteristics of mothers and their households for the cross-sectional data from 1983 to 2005.

In the 1983 survey year, the average age of the sample woman was around 26 years with an average BMI of 22.98. Out of 3,323 mothers 78.5 per cent were categorized

as normal and 1.4 per cent were considered obese based on the WHO definition for adult BMI. Regarding their smoking habits, 16.4 per cent of them smoked and out of these, 90.4 per cent smoked at least one cigarette a day. Regarding their drinking habits, 35.4 per cent drank alcoholic beverages and out of these, 96.5 per cent drank at least 15 ml of an alcoholic beverage daily. Regarding household characteristics, 89.1 per cent lived in male-headed households with an average household size of about six. Most of these households were comprised of 25- to 59-year-old males (15.8 per cent) and about 77 per cent were located in an urban barangay. Most of the mothers had completed primary school (about 53 per cent).

In the 1991 follow-up survey, 2,394 mothers had an average age of 35 with an average BMI of 23.22, a slight increase from 1989. From 1994, there was an upward trend in average BMI and a decreasing trend in normal BMI over the years. By 1991, the percentage of mothers with normal BMI decreased to about 65 per cent from about 79 per cent in 1983, which further decreased to 50 per cent by 2005.

In 2005, the average age of mothers was about 48. Regarding their smoking and drinking habits, there were no data for three survey years (1991, 1994 and 1998). By 2002 and 2005, fewer mothers smoked daily: there was a notable decline, from about 90 per cent in 1983 to about 14 per cent in 2005. It should be noted that out of those who used to smoke, 3.5 per cent quit smoking in 2002 while 1.2 per cent quit in 2005. Regarding drinking habits (at least 15 ml of alcohol a day), there was a drastic decrease from about 97 per cent in 1983 to less than 1 per cent in 2005. However, a significant degree of attrition should be noted, from 3,323 mothers in 1983 to 2,010 in 2005. Those

mothers who regularly consumed alcohol reported drinking usually beer (about 58 per cent); of those who drank daily, about 69 per cent chose tuba.

By 2002, an additional variable was added to the survey – raised blood pressure. About 22 per cent of mothers had high blood pressure, which increased to about 29 per cent in 2005. Over the survey years, the average household size remained almost the same (about seven household members) and the majority (80–90 per cent) were still headed by males. From 1991 until 2005, the households of mothers were mostly composed of adult females (25–59 years old): about 20 per cent by 2005. Most of the households were located in urban areas and most of the mothers had completed only a primary level of education (about 50–56 per cent).

B. Independent variables for index child regression

In Table 2b, we report index child characteristics across cross-sectional data from 1983 to 2009. From 1983 to 1998, the typical computation of BMI could not yet be applied to children. We also note that the household characteristics of the index child during these survey years were identical to that of the mother's, since the index children still lived with their mothers at that age (on average, the index children were about 15 years of age by 1998). It was only starting from the 2002 follow-up survey year, when the average age of an index child was about 18, that the index child started forming families.

From the baseline survey (1983), the average birth weight of the index child was about 3 kilograms (kg) (3,020 grams) and about 48 per cent weighed more than 2,496 grams to 3,175 grams.

By survey year 2002, the average BMI of an index child was about 20; about 67 per cent were considered normal and about 0.9 per cent were obese (aggregate of Obese

I, II and III classes). Regarding their smoking habits, in 2002, of the 2,035 index children, about 51 per cent smoked while about 19 per cent of them smoked at least 1 cigarette a day. However, about 25 per cent of them reported that they already stopped smoking by the time of the survey. Regarding their drinking habits, about 80 per cent drank alcohol at the time of survey and out of these only 0.3 per cent drank at least 15 ml of an alcoholic beverage daily while about 19 per cent had stopped drinking.

For the succeeding survey years (2005–2009), the average BMI of the index children increased slightly from about 21 in 2005 to about 22 in 2009. The incidence of obesity also increased over the same period, reaching about 4 per cent by 2009 from less than 2 per cent in 2005. The incidence of smoking reached its highest point in 2009, when about 61 per cent of the 1,650 index children were reported to be smokers. Similarly, the daily smoking habit increased to about 32 per cent in 2009. By 2009, about 95 per cent of the index children were drinkers and about 1.5 per cent had a daily drinking habit. Meanwhile, those with high blood pressure increased to about 1 per cent in 2009.

Throughout the survey years, about 50 per cent of the index children were males. On average, the index child's age at the first instance of smoking or drinking was about 15 in 2002. In addition, most of the households that the index children belonged to were located in urban areas (70–77 per cent), were mostly composed of either adult males or females (25–59 years old) and mostly headed by males (75–82 per cent). By 2009, the average age of index children was about 25 and only about 36 per cent had finished college while about 51 per cent had finished secondary school.

3.3 *Methodology*

3.3.1 *Cox proportional hazards model*

This research aims to use duration models, which, in health economics, compute the 'time until failure'. This paper considers a semiparametric duration model, commonly known as the proportional hazards model of Cox (1972), which leaves the baseline hazard function unspecified. The Cox proportional hazards model assumes no intercept. It asserts that the hazard rate for the *i*th subject in the data is:

$$h(t|\boldsymbol{x}_i) = h_0(t)\exp(\boldsymbol{x}_i\beta_x) \quad (1)$$

where $\boldsymbol{x}_i$ are the covariates and $h_0(t)$ is the baseline hazard. That is, the hazard that person *i* faces is multiplicatively proportional to the baseline hazard. The function *exp*(.) was chosen to avoid the problem of $h_i(t)$ ever turning negative. The regression coefficients, β_x, are to be estimated from the data, while $h_0(t)$ is given no particular parameterization and can be left unestimated. From the initial identified covariates, this research will particularly test the model for the mother-level data:

$$h(t|bmi_i, smk_i, alc_i, \boldsymbol{m}_i, \boldsymbol{h}_i) = h_0(t)\exp(bmi_i\beta_1 + smk_i\beta_2 + alc_i\beta_3 + \boldsymbol{m}_i\beta_x + \boldsymbol{h}_i\beta_{x+1}) \quad (2)$$

where $h(t|\boldsymbol{x}_i)$ is hazard function which determines the probability that coronary heart disease, respiratory ailment or diabetes occurs to mother *i*; bmi_i is mother *i*'s adult body mass index; smk_i is equal to 1 if individual *i* is smoking, 0 otherwise; alc_i is equal to 1 if individual mother *i* consumes alcohol, 0 otherwise; $\boldsymbol{m}_i$ is a vector of mother *i*'s characteristics; and $\boldsymbol{h}_i$ is a vector of mother *i*'s household characteristics. We take note

that there are no observations for smoking and drinking behaviors of mothers for years 1991, 1994 and 1998.[1]

For the child-level data, we will have:

$$h(t|birthwgt_i, bmi_i, smk_i, alc_i, \boldsymbol{c}_i, \boldsymbol{h}_i) = h_0(t)\exp(birthwgt_i\beta_1 + bmi_i\beta_2 + smk_i\beta_3 + alc_i\beta_4 + \boldsymbol{c}_i\beta_x + \boldsymbol{h}_i\beta_{x+1}) \quad (3)$$

where $h(t|\boldsymbol{x}_i)$ is a hazard function which determines the probability that coronary heart disease, respiratory ailment or diabetes occur to child i; $birthwgt_i$ is the child's birth weight, bmi_i is i's child's body mass index; smk_i is equal to 1 if child i is smoking, 0 otherwise; alc_i is equal to 1 if individual child i consumes alcohol, 0 otherwise; $\boldsymbol{c}_i$ is a vector of child i's characteristics; and $\boldsymbol{h}_i$ is a vector of child i's household characteristics. We note that the smoking and drinking behaviors of children only started in survey year 2002.

As in Rich-Edwards et al. (2005), we will also test for the interaction of birth weight and postnatal BMI for the child-level data, hence we will have:

$$h(t|birthwgt_i, bmi_i, smk_i, alc_i, \boldsymbol{c}_i, \boldsymbol{h}_i, birthwgt_i * bmi_i) = h_0(t)\exp(birthwgt_i\beta_1 + bmi_i\beta_2 + smk_i\beta_3 + alc_i\beta_4 + birthwgt_i * bmi_i\beta_5 + \boldsymbol{c}_i\beta_x + \boldsymbol{h}_i\beta_{x+1}) \quad (4)$$

[1] We will have three independent regressions conditional on the measures of BMI in the study: (a) as a continuous variable; (b) as a categorical variable based on the definition of WHO and (c) as a binary variable for obesity.

where the interaction term for child i's birth weight and postnatal BMI, $(birthwgt_i * bmi_i)$ is added to Equation (3).

We interacted the two variables in three ways. First, following Rich-Edwards et al. (2005), we generated centile crossing by collapsing the birth weight categories into four and determined their corresponding centiles: (a) <2.50 kg (<10th centile), (b) 2.50 kg to <3.18 kg (10th centile to 65th centile), (c) 3.19 kg to <3.86 kg (66th centile to 96th centile) and (d) >3.87 kg (>96th centile). From the birth weight centile, we generated the centile classification of BMI that corresponds to the centiles as determined.

Second, instead of following the birth weight classification of Rich-Edwards et al. (2005), we generated quintiles for birth weight. This makes a uniform distribution for the categories: (a) <2,721 g (1st quintile), (b) 2,721 g to 2,948 g (2nd quintile), (c) >2,948 g to 3,175 g (3rd quintile), (d) >3,175g to 3,401 g (4th quintile) and (e) >3,401 g (5th quintile). The generated quintiles for BMI still correspond to the quintiles in birth weight.

Third, we used the University of New South Wales (UNSW) birth weight classification: (a) very low (<2,000 g), (b) low (2,000g to <2,500g), (c) normal (2,500 g to <4,000 g)[2], and (d) high (4,000 g and above). Instead of using 'centile crossing', we used the BMI classification of each child: (a) underweight, (b) normal, (c) overweight and (d) obese as defined by WHO.

3.3.2 *Probit models*

[2] In one of the runs, normal was decomposed further into lower normal (2,500 g to <3,000 g), middle normal (3,000 g to <3,500 g) and upper normal (3,500 g to <4,000 g).

This research will also utilize Probit models to investigate the impact of different risk factors on various diseases for each year where the independent variable is considered as a discrete variable. For the mother-level data, we will have:

$$P(y_{i,j} = 1|bmi_i, smk_i, alc_i, \boldsymbol{m}_i, \boldsymbol{h}_i) = G(age_i\beta_1 + bmi_i\beta_2 + smk_i\beta_3 + alc_i\beta_4 + \boldsymbol{m}_i\beta_x + \boldsymbol{h}_i\beta_{x+1}) \quad (5)$$

where *G* is the standard normal cumulative distributive function taking on values strictly between zero and one: $0 < G(z) < 1$, for all real numbers *z* (Wooldridge, 2006); $y_{i,j}$ is equal to 1 if mother *i* has *j* illness such as coronary heart disease, respiratory ailments or diabetes. The rest of the variables are as defined in Equation (2).

In the same way, for the child-level data, we will have:

$$P(y_{i,j} = 1|birthwgt_i, bmi_i, smk_i, alc_i, \boldsymbol{c}_i, \boldsymbol{h}_i) = G(birthwgt_i\beta_1 + bmi_i\beta_2 + smk_i\beta_3 + alc_i\beta_4 + \boldsymbol{c}_i\beta_x + \boldsymbol{h}_i\beta_{x+1}) \quad (6)$$

where $y_{i,j}$ is equal to 1 if the child *i* has *j* illness such as coronary heart disease, respiratory ailments or diabetes. The rest of the variables are as defined in Equation (3).

4. Results

This section is divided into three. The first section focuses on the results of estimating Equations (5) and (6) using Probit both at the mother and index child level (Tables 3 and 4). The second section provides a discussion of results after estimating Equation (2) using the Cox proportional hazards model at the mother level (Tables 5 and 6). The last section

focuses on the results after estimating Equations (3) and (4) using the Cox model at the index child level (Tables 7 and 8).

4.1 *Probit models*

4.1.1 *Mother-level probit models (Simple regression)*

The results in Table 3.1 show that, using Probit model, for almost all the survey years, except 2002, mothers who were underweight were more likely to have TB relative to those with a normal BMI. These results are consistent when we examine the mother's BMI: over the years, as the mother's BMI decreased, the more likely it was that she developed TB.

With respect to those who were hospitalized due to hypertension, consistent across all survey years (1991, 1994, 1998, 2001 and 2005), this incidence was positively correlated with the mother's BMI. This correlation increased over the years (from less than 1 per cent to about 1.4 per cent), which could be attributed to other characteristics and risk factors of the mother, unaccounted for yet, such as age, smoking habits and drinking habits. If we examine the categorical BMI instead of the continuous variable, we can see that, consistently, those who were overweight, obese class I and class II were more likely to be hospitalized due to hypertension relative to those with normal BMI.

An indicator for obesity (BMI $\geq$30.0) is consistently and positively correlated with the likelihood of being hospitalized due to hypertension for four survey years (1994, 1998, 2002 and 2005). In particular, mothers who were obese were about 8.5 per cent to 15 per cent more likely to be hospitalized due to hypertension relative to those who were not obese. In addition, in 2005, those who were obese were also about 4 per cent more likely to have diabetes.

4.1.2 *Mother-level probit models (Multiple regression)*

After controlling for the characteristics of the mother and her household, the Probit regressions for years 1991, 1994 and 1998 reveal consistent results without control variables (Table 3.2). As the mother's BMI increased, she was more likely to be hospitalized due to hypertension. This probability increased over the years from less than 1 per cent in 1991 to 1.1 per cent in 1998. In particular, those who were overweight and obese class I were more likely to be hospitalized relative to those with normal BMI and this probability also increased over time.

In terms of TB, again consistent with simple regressions, the lower the BMI the more likely the mother was to have TB. In particular, those who were underweight were more likely to have TB relative to those with normal BMI. Those who were likely to have diabetes were the ones with higher BMI, as evidenced from 1998.

For years 2002 and 2005, we also control for variables that were added in these survey years such as smoking and drinking habits, raised blood pressure and kinds of alcoholic beverages. The results are consistent with those of 1991–1998: as BMI increased mothers were more likely to be hospitalized with hypertension. In addition, the new variable, increased blood pressure, had a positive correlation with hospitalization. In particular, those with high blood pressure were about 18 to 23 per cent more likely to be hospitalized.

Obesity is positively correlated with different diseases; these results are consistent with simple regressions without controlling for other variables. In particular, in 1994, those who were obese were 5 per cent more likely to be hospitalized due to hypertension,

which increased to 10 per cent in 1998. They were also more likely to have diabetes in 1998 (about 2 per cent) and to have heart disease in 2005 (about 6 per cent).

4.1.3 *Child-level probit models (Simple Regression)*

Table 4.1 and Appendix B depict the results of estimating Equation (6) without control variables using the Probit model for individual years 1991 to 2009. For the years 1991, 1994 and 1998, the only independent variable considered was birth weight, which is measured in two ways (discrete and categorical variables), since the BMI classification of WHO only applies to those 18 years and above and was therefore only considered after 2002 when the child, on average, was about 18 years old.

Children who were underweight (relative to those with normal BMI) in 2002 were 4.2 per cent more likely to have respiratory illnesses and 2.7 per cent more likely to have chronic respiratory illnesses. Being underweight also increased the likelihood of acquiring chronic respiratory disease in 2005 (2.4 per cent) and in 2007 (about 1.7 per cent).

In addition, those who smoked daily (relative to those who did not smoke daily) in 2002 were 4.4 per cent more likely to have respiratory illness. In fact, the adverse impact of smoking on the respiratory system increased from 4.4 per cent in 2005 to about 10 per cent in 2007. The negative effect of smoking persisted even if the child decided to quit smoking as in 2005 (4 per cent more likely to have respiratory illness) and in 2007 (9 per cent more likely to have respiratory disease).

In 2007, the statistically significant result pertains to the impact of the child's BMI on the probability of being hospitalized due to CVD. Albeit a small magnitude, an

increase in BMI resulted in an increase in the probability of being hospitalized due to CVD (less than 1 per cent). A child's BMI was also positively correlated with hypertension in 2009 (less than 1 per cent). In the same year, raised blood pressure resulted in an increase in the probability of: having hypertension and CVD (about 3 per cent), being hospitalized due to CVD (about 3 per cent) and having diabetes (about 2 per cent).

4.1.4 *Child-level probit models (Multiple Regression)*

Control variables, such as child and household characteristics, were added in the regressions to accurately estimate the impact of birth weight, BMI, smoking and alcohol consumption on the probability of having respiratory illnesses, CVD, hypertension and diabetes, and being hospitalized due to these illnesses. The results of estimating Equation (6) with control variables using the Probit model can be gleaned from Table 4.2 and Appendix B for the seven survey years (1991, 1994, 1998, 2002, 2005, 2007 and 2009).

In 2002, children whose birth weight was below the normal weight or those whose birth weight fell under the range of 2,268 g to 2,495 g were more likely to have respiratory illnesses (between 13.4 per cent to 13.7 per cent, Columns 4 and 6), while those whose birth weight was above 4,536 g were also more likely to have respiratory illnesses (about 4 per cent) than those with normal birth weight (Columns 2, 4 and 6). In 2007, those whose birth weight fell below normal or those who were <2,268 g were about 16 per cent more likely to have CVD and in 2009, they were more likely to have hypertension (1.7 per cent) and diabetes (about 6 per cent). In a later section, we will explore the nuances in the impact of birth weight and BMI on health outcomes by

interacting these two. For example, we want to determine whether centile crossing exists or whether those born underweight who then became heavy during adulthood were more likely to have certain illnesses than those who had a normal weight from birth to adulthood.

Smoking behavior adversely affected the health outcomes of children in 2002 and 2005. In particular, those who smoked daily had a higher probability (between 8 and 9 per cent) of having respiratory illnesses in 2002, having chronic respiratory illness and being hospitalized due to this in 2005 (about 2 per cent), and having CVD in 2009 (between 2 and 3 per cent).

Obesity also plays a role in the health outcomes of children. In particular, it is positively correlated with having diabetes (6 per cent in 2002), hypertension (2.2 per cent to 3.4 per cent in 2009) and CVD (1.4 per cent in 2009).

Raised blood pressure also affects the different health outcomes of children. In 2002, it is positively correlated with being hospitalized due to respiratory illness (between 2 per cent and 3.6 per cent), and in 2009 it increased the probability of having hypertension (1 per cent to 2 per cent) and having diabetes (about 2 per cent to 5 per cent contingent on the way BMI is measured).

4.2 The Cox proportional hazard models

4.2.1 The mother-level Cox proportional hazard models (Simple Regression)

Table 5 shows the initial results of estimating Equation (2) using the Cox proportional hazards model for mothers. We have identified six illnesses for mothers, namely: heart disease, TB, diabetes, raised blood pressure, hospitalization due to hypertension and

cardiovascular ailments. Initial results tell us that the risk factors identified have no significant relation with the incidence of TB and hospitalization due to hypertension.

In the case of heart disease, results show that mothers with higher BMI are less likely to have heart disease (about 3 per cent); however, we take note that obesity has no significant effect on the hazard ratio, which could imply that the captured impact on BMI is only for those with normal BMI. With regard to smoking, mothers that are currently smoking and are smoking daily have higher hazards of having heart disease, while those that are obese (class II) have significantly higher probability of having CVD ailments with 103 events.

4.2.2 The Mother-level Cox proportional hazard models (Multiple Regression)

In Table 6, we include controls for the characteristics of the mother and her household. The regression runs did not produce results for TB, diabetes and hospitalization due to hypertension because of a small sample size. For illnesses with results, consistent with simple regressions using the Cox proportional hazards model, those who smoked were more likely to have heart disease. In addition, those who were underweight were less likely to have a CVD ailment, while those classified as obese II were likely to have this illness relative to those with normal BMI. In addition, those who drank gin or rum, relative to beer, were more likely to have heart disease. A possible explanation is that those who had a heavy drinking habit, which could lead to more adverse health outcomes, drank gin or rum.

The results should be interpreted with caution since only a few observations were included in the analysis for heart disease (46) and CV ailments (102) due to data

limitations and age effects.[3] There were also some contradicting results, which could be attributed to spurious regressions.[4]

4.2.3 The Child-level Cox proportional hazard models

For estimating Equation (3) using the Cox proportional hazard models for children, we use the following four different measures of birth weight. First, we follow the six classifications of Rich-Edwards et al. (2005): (a) <2,268 g; (b) 2,268g to 2495g; (c) >2,495g to 3,175 g; (d) >3,175g to 3,856 g; (e) >3,856g to 4,536 g and (f) >4,536 g. The reference category based on the most number of observations is >2,495g to 3,175 g.

Second, we generate our own quintiles both for BMI and birth weight based on the data from CLHNS. Third, we use the four birth weight categories by UNSW, namely: (a) very low (<2,000 g); (b) low (2,000g to <2,500 g); (c) normal (2,500g to <4,000 g) and (d) high (4,000 g and above). Fourth, we expand the normal category as defined by UNSW into three, and thus use six birth weight classifications: (a) very low (<2,000g); (b) low (2,000g to <2,500 g); (c) lower normal (2,500g to <3,000g); (d) middle normal (3,000g to <3,500 g); (e) upper normal (3,500g to < 4,000 g) and (f) high (4,000 g and above).

Appendix D shows the results of estimating Equation (3) using the hazards model for the different measures of birth weight and for different diseases (respiratory ailments, heart diseases, CVD and diabetes) adjusted first for age then adjusted for both age and adult BMI. Table 7, which presents the specific results for heart disease across all

[3] Mothers, on average, were only about 47 years old in 2005.
[4] For example, among the 46 mothers, those who were overweight or classified as obese I were less likely to have a heart disease.

categories of birth weight, shows that as birth weight increases by 1 kg over the years (from 1991 to 2009), the risk of having heart disease increases by less than 1 per cent.

Appendix E shows the results of estimating Equation (4) after interacting birth weight and adult BMI to predict the risk of having respiratory ailments, CVD, diabetes and raised blood pressure using four methods of deriving and interacting birth weight and BMI categories and centiles.[5] Table 8 shows the only statistically significant results for raised blood pressure – children whose birth weight belonged to the fourth quantile and whose adult BMI belonged to the third quantile were more at risk of having high blood pressure. Alternatively, the risk of raised blood pressure was higher among those who were bigger infants at birth and grew to be lighter adults.

5. Conclusion

The goal of this research is twofold. First, this paper aims to examine whether the prenatal environment determines the risks of cardiovascular disease later in life by testing the impact of the birth weight of children (and its interaction with adult body mass index or BMI, kg/m^2) born in 1983 on the probability of having CVD later. In effect, this paper endeavors to test the 'fetal origins hypothesis' using longitudinal data from Cebu (1983 to 2009). Recent literature points to an inverse association between birth weight and CVD especially when interacted with adult BMI. We expand our research to also consider

[5] For the first method (Runs 1 and 2), birth weight centiles were grouped into four: (1) <2.50 kg (<10th centile); (2) 2.50 kg to <3.18 kg (10th centile to 65th centile); (3) 3.19 kg to <3.86 (66th centile to 96th centile); and (4) >3.87 kg (>96th centile), where >2,495 g to 3,175 g is the reference category based on the most number of observations. From the birth weight centile, we generated the centile classification of BMI, which corresponds to the centiles determined above. For the second method, quintiles are generated instead for both birth weight and BMI. For the third method, instead of centiles and quintiles, we used the UNSW birth weight classifications interacted with the WHO BMI categories. The fourth method is similar to the third method but the normal birth weight is decomposed further into three categories.

other health outcomes such as hypertension, TB) and diabetes, following existing studies (Huxley, et al., 2002; Koupilova et al., 1999) as well as being hospitalized because of these ailments. Second, we also explore the association of adult BMI and illnesses of mothers to make the analysis richer given that index children included in the longitudinal dataset were only about 25 years, on average, in 2009.

We use the Cox proportional hazards model to estimate hazard ratios adjusted for age and risk factors in adulthood such as cigarette smoking. We compare the risk of disease for children in a given birth weight category with that of children who weighed between 2,495 g and 3,175 g using hazard ratios, and we also examine the per kg increase in birth weight across all categories. Our results suggest that, contrary to the results in most of the existing studies, there is a positive association between birth weight and heart disease. We also explore the interaction of birth weight and postnatal BMI by examining 'centile crossing' in body size from birth to adulthood. We find that the risk of raised blood pressure was higher among those who were bigger infants at birth and grew to be lighter adults.

For sensitivity analysis, we also estimate the association between birth weight, BMI and adult health outcomes using Probit models. The results show that children who were underweight at birth were more likely to have CVD and hypertension, which are consistent with the findings in the existing literature (Rich-Edwards et al., 2005; Lawlor et al., 2004; Rich-Edwards, 2005; Barker et al., 2002; Forsen et al., 1999).

For mothers, we find that those who were classified as obese II (BMI=35.0-39.99) were more likely to have CVD relative to those with normal BMI. In addition, BMI is

found to be positively associated with hypertension. We also find that adult obesity and smoking adversely affect the health outcomes of children and mothers.

Our research can benefit from further exploration especially once longer panel data become available. Current dataset limits the analysis to children who were 25 years old in 2009; at this age, most of the adult diseases such as CVD and diabetes normally have not yet manifested. It would also be interesting to examine other functions for the hazard rate models.

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Table 1a. Descriptive Statistics for Mother-Level Dependent Variables (mean, standard deviation), 1991–2005

Covariate	*Stata name*	Description	Survey years				
			1991	1994	1998	2002	2005
Heart disease	*mheartd_cl*	=1 if woman has heart disease	0.044 (0.206)	0.061 (0.285)	0.089 (0.285)	0.089 (0.284)	0.079 (0.270)
Diabetes	*mdiabet_cl*	=1 if woman has diabetes	0.010 (0.098)	0.021 (0.115)	0.021 (0.144)	0.034 (0.182)	0.047 (0.212)
Tuberculosis	*mtuberc_cl*	=1 if woman has tuberculosis	0.009 (0.093)	0.007 (0.082)	0.007 (0.081)	0.008 (0.087)	0.007 (0.083)
Hospitalized due to hypertension	*mhyper_hosp_cl*	=1 if woman was hospitalized due to hypertension	0.004 (0.065)				
CVD ailment	*mCVD_ill_cl*	=1 if woman has CVD ailments (hypertension, high blood pressure)		0.047 (0.211)			
Hypertension	*mhyper_cl*	=1 if woman has hypertension			0.119 (0.324)	0.162 (0.369)	0.191 (0.393)
N			*2,394*	*2,776*	*1,985*	*2,099*	*2,010*

Table 1b. Descriptive Statistics for Child-Level Dependent Variables (mean, standard deviation), 1991–2009

Covariate	Stata name	Description	Survey years						
			1991	1994	1998	2002	2005	2007	2009
Child tuberculosis	*ctuberc2_cl*	=1 if child has tuberculosis	0.011 (0.105)						
Hospitalized due to tuberculosis	*ctuberc_hosp2_cl*	=1 if child was hospitalized due to tuberculosis		0.0005 (0.0213)					
Child respiratory ailment	*crespi2_cl*	=1 if child has respiratory ailments				0.257 (0.437)	0.114 (0.318)	0.144 (0.351)	0.522 (0.500)
Child heart disease	*cheartd2_cl*	=1 if child has heart disease			0.001 (0.031)	0.002 (0.049)	0.001 (0.032)		0.005 (0.072)
Child cardiovascular ailment	*cCVD2_cl*	=1 if child has cardiovascular ailment			0.001 (0.031)	0.003 (0.054)	0.003 (0.056)	0.008 (0.087)	
Child hypertension	*chyper2_cl*	=1 if child has hypertension							0.004 (0.064)
Child diabetes	*cdiabet2_cl*	=1 if child has diabetes				0.001 (0.031)	0.001 (0.023)	0.002 (0.041)	0.005 (0.072)
Child diabetes (chronic)	*cdiabet_chronic2_cl*	=1 if child has diabetes considered as chronic				0.0005 (0.022)			
N			*2,264*	*2,199*	*2,089*	*2,040*	*1,904*	*1,825*	*1,720*
Hospitalized due to respiratory ailment	*crespi_hosp2_cl*	=1 if child was hospitalized due to respiratory ailments				0.0099 (0.0990)	0.0255 (0.1577)	0.0149 (0.1211)	0.0064 (0.0798)
Hospitalized due to heart disease	*cheartd_hosp2_cl*	=1 if child was hospitalized due to heart disease		0.0005 (0.0213)					
Hospitalized due to cardiovascular ailment	*cCVD_hosp2_cl*	=1 if child was hospitalized due to CVD ailments				0.0008 (0.0276)	0.0034 (0.0582)	0.0032 (0.0564)	0.0028 (0.0533)
Hospitalized due to diabetes	*cdiabet_hosp2_cl*	=1 if child was hospitalized due to diabetes				0.0008 (0.0276)		0.0011 (0.0326)	0.0007 (0.0267)
N				*2,199*		*1,315*	*589*	*941*	*1,405*

Table 2a. Descriptive Statistics for Mother-Level Independent Variables (mean, standard deviation)

Covariate	*Stata name*	Description	Survey years					
			1983	1991	1994	1998	2002	2005
BMI	*mBMI_cl*	Calculated sample average woman's body mass index	22.975 (2.682)	23.219 (3.771)	22.805 (3.870)	23.618 (4.117)	24.242 (4.286)	24.292 (4.335)
Categorical BMI	*mBMI_categ_cl*	Underweight (BMI <18.5)	0.020	0.079	0.121	0.090	0.092	0.086
		Normal (BMI=18.5–24.9)	0.785	0.648	0.615	0.557	0.491	0.500
		Overweight (BMI=25.0–29.9)	0.180	0.218	0.217	0.287	0.325	0.319
		Obese Class I (BMI=30.0–34.9)	0.013	0.049	0.044	0.058	0.083	0.082
		Obese Class II (BMI=35.0–39.99)	0.001	0.006	0.004	0.008	0.008	0.012
		Obese Class III (BMI ≥40)	0.0003	0.0004	0.0004	0.001	0.001	0.002
Obesity	*mobese3_cl*	=1 if woman is obese	0.014 (0.119)	0.056 (0.229)	0.048 (0.214)	0.066 (0.249)	0.093 (0.290)	0.095 (0.294)
Age	*mage_cl*	Sample average woman's age	26.039 (5.982)	34.976 (6.103)	34.650 (9.088)	41.932 (6.124)	45.149 (6.143)	47.858 (6.075)
Smokes	*msmokes2_cl*	=1 if woman smokes	0.164 (0.371)				0.202 (0.401)	0.163 (0.369)
Smokes daily	*msmokes_daily2_cl*	=1 if woman smokes at least one stick per day	0.904[a/] (0.294)				0.148 (0.355)	0.137 (0.344)
Quit smoking	*msmoke_quit_cl*	=1 if woman stopped smoking					0.035 (0.184)	0.012 (0.111)
Raised blood pressure	*highBP2_cl*	=1 if woman has high blood pressure					0.217 (0.412)	0.289 (0.453)
Drinks alcohol	*malcohol2_cl*	=1 if woman currently drinks alcoholic beverages	0.354 (0.478)				0.404 (0.491)	0.379 (0.485)
Drinks alcohol daily	*malcohol_daily2_cl*	=1 if woman drinks at least 15 ml of alcoholic beverage daily	0.965[b/] (0.185)				0.006 (0.078)	0.005 (0.070)
N			*3,323*	*2,394*	*2,776*	*1,985*	*2,099*	*2,010*

Note: [a/]Number of observations, *N=450.* [b/]*Number* of observations, *N=255*.

Table 2a. Descriptive Statistics for Mother-Level Independent Variables, continued

Covariate	*Stata name*	Description	Survey years					
			1983	1991	1994	1998	2002	2005
Household head gender	*genderhh_cl*	=1 if household head is male	0.891 (0.312)				0.823 (0.382)	0.790 (0.407)
Household size	*hhsize_cl*	Size of the mother's household	5.633 (2.813)	6.888 (2.366)	6.822 (2.564)	7.033 (2.541)	6.779 (2.586)	6.612 (2.606)
Household proportion of less than 1 y/o males	*prop_male_less1yo_cl*	Proportion of less than 1 y/o males in the mother's household	0.044 (0.052)	0.010 (0.038)	0.012 (0.046)	0.006 (0.028)	0.008 (0.033)	0.009 (0.035)
Household proportion of 1–6 y/o males	*prop_male_oneto6yo_cl*	Proportion of 1–6 y/o males in the mother's household	0.139 (0.125)	0.095 (0.114)	0.066 (0.101)	0.042 (0.073)	0.035 (0.071)	0.035 (0.074)
Household proportion of 7–14 y/o males	*prop_male_sevento14yo_cl*	Proportion of 7–14 y/o males in the mother's household	0.061 (0.090)	0.176 (0.139)	0.158 (0.145)	0.104 (0.115)	0.085 (0.111)	0.068 (0.102)
Household proportion of 15–24 y/o males	*prop_male_fifteento24yo_cl*	Proportion of 15–24 y/o males in the mother's household	0.086 (0.113)	0.055 (0.094)	0.095 (0.124)	0.191 (0.149)	0.203 (0.154)	0.197 (0.153)
Household proportion of 25–59 y/o males	*prop_male_twentyfiveto59yo_cl*	Proportion of 25–59 y/o males in the mother's household	0.158 (0.090)	0.159 (0.072)	0.154 (0.087)	0.150 (0.083)	0.163 (0.101)	0.181 (0.117)
Household proportion of 60 y/o and above males	*prop_male_sixttyabove_cl*	Proportion of 60 y/o and above males in the mother's household	0.008 (0.029)	0.006 (0.028)	0.008 (0.035)	0.008 (0.035)	0.011 (0.047)	0.015 (0.055)
Household proportion of less than 1 y/o females	*prop_fem_less1yo_cl*	Proportion of less than 1 y/o females in the Mother's household	0.038 (0.048)	0.010 (0.038)	0.010 (0.042)	0.006 (0.026)	0.006 (0.027)	0.008 (0.031)
Household proportion of 1–6 y/o females	*prop_fem_oneto6yo_cl*	Proportion of 1–6 y/o females in the mother's household	0.131 (0.122)	0.090 (0.111)	0.064 (0.098)	0.039 (0.073)	0.035 (0.070)	0.034 (0.070)
Household proportion of 7–14 y/o females	*prop_fem_sevento14yo_cl*	Proportion of 7–14 y/o females in the mother's household	0.061 (0.090)	0.163 (0.136)	0.149 (0.138)	0.141 (0.132)	0.080 (0.109)	0.061 (0.097)
Household proportion of 15–24 y/o females	*prop_fem_fifteento24yo_cl*	Proportion of 15–24 y/o females in the mother's household	0.123 (0.125)	0.049 (0.088)	0.111 (0.135)	0.124 (0.133)	0.171 (0.145)	0.171 (0.147)
N			*3,323*	*2,394*	*2,276*	*1,985*	*2,099*	*2,010*

Table 2a. Descriptive Statistics for Mother-Level Independent Variables, continued

Covariate	*Stata name*	Description	Survey years					
			1983	1991	1994	1998	2002	2005
Household proportion of 25–59 y/o females	*prop_fem_twentyfiveto59yo_cl*	Proportion of 25–59 y/o females in the mother's household	0.140 (0.095)	0.175 (0.081)	0.163 (0.083)	0.177 (0.077)	0.189 (0.098)	0.202 (0.111)
Household proportion of 60 y/o and above females	*prop_fem_sixttyabove_cl*	Proportion of 60 y/o and above females in the mother's household	0.011 (0.034)	0.009 (0.036)	0.011 (0.041)	0.011 (0.042)	0.014 (0.054)	0.020 (0.069)
Urbanity	*urban_cl*	=1 if household is an urban barangay	0.768 (0.422)	0.738 (0.440)	0.726 (0.446)	0.713 (0.453)	0.714 (0.452)	0.695 (0.461)
Mother's highest educational attainment	*mhigheduc_cl*	No grade completed	0.018	0.019	0.017	0.020	0.021	0.020
		Elementary level	0.526	0.539	0.486	0.541	0.557	0.552
		High school level	0.304	0.297	0.355	0.292	0.289	0.294
		College level	0.147	0.135	0.134	0.132	0.120	0.121
		Post-graduate level	0.005	0.010	0.008	0.016	0.014	0.013
N			*3,323*	*2,394*	*2,276*	*1,985*	*2,099*	*2,010*
Kind of alcoholic drink	*malcohol_kind2_cl*	Tuba					0.158	0.133
		Beer					0.581	0.676
		Gin					0.117	0.056
		Rum					0.097	0.079
		Wine					0.020	0.051
		Others					0.027	0.005
N							*847*	*762*
Kind of alcoholic daily drink	*malcohol_daily2_kind_cl*	Tuba					0.692	0.500
		Beer					0.077	0.200
		Gin						0.100
		Rum						
		Wine					0.154	0.200
		Others					0.077	
N							*13*	*10*

Table 2b. Descriptive Statistics for Child-Level Independent Variables (mean, standard deviation)

Covariate	*Stata name*	Description	Survey years							
			1983	1991	1994	1998	2002	2005	2007	2009
Index child's birth weight	*birthwgt_cl*	Index child's reported birth weight measure in grams	3,020.267 (483.537)							
Categorical birth weight	*birthwgt_categ_cl*	< 2,268 g	0.064							
		2,268 g to 2,495 g	0.057							
		> 2,495 g to 3,175 g	0.477							
		> 3,175 g to 3,856 g	0.368							
		> 3,856 g to 4,536 g	0.031							
		> 4,536 g	0.002							
BMI	*cBMI_cl*	Calculated sample average index child's body mass index					20.108 (2.756)	20.731 (3.140)	20.315 (3.457)	22.405 (3.729)
Categorical BMI	*cBMI_categ_cl*	Underweight (BMI <18.5)					0.273	0.215	0.318	0.120
		Normal (BMI=18.5–24.9)					0.671	0.695	0.589	0.665
		Overweight (BMI=25.0–29.9)					0.048	0.073	0.078	0.175
		Obese class I (BMI=30.0–34.9)					0.007	0.014	0.012	0.034
		Obese class II (BMI=35.0–39.99)					0.001	0.002	0.002	0.005
		Obese class III (BMI ≥40)					0.001	0.001	0.001	0.001
Obesity	*cobese2_cl*	=1 if index child is obese					0.008 (0.091)	0.017 (0.129)	0.015 (0.122)	0.040 (0.196)
Smokes	*csmoke_cl*	=1 if index child smokes					0.511 (0.500)	0.596 (0.491)	0.520 (0.500)	0.606 (0.489)
Smokes daily[a/]	*csmoke_daily_cl*	=1 if index child smokes at least one stick per day					0.192 (0.394)	0.245 (0.430)	0.323 (0.468)	0.324 (0.468)
Quit smoking	*csmoke_quit_cl*	=1 if index child stopped smoking					0.248 (0.432)	0.297 (0.457)	0.170 (0.376)	0.227 (0.419)
Raised blood pressure	*chighBP2_cl*	=1 if index child has high blood pressure				0.020 (0.139)	0.027 (0.162)	0.083 (0.276)	0.104 (0.306)	0.085 (0.280)
N			*2,641*			*1,929*	*2,035*	*1,900*	*1,735*	*1,650*

Table 2b. Descriptive Statistics for Child-Level Independent Variables, continued

Covariate	*Stata name*	Description	Survey years							
			1983	1991	1994	1998	2002	2005	2007	2009
Drinks alcohol	*calcohol_cl*	=1 if index child currently drinks alcoholic beverages					0.799	0.924	0.855	0.945
							(0.401)	(0.266)	(0.352)	(0.228)
Drinks alcohol daily[b/]	*calcohol_daily_cl*	=1 if index child drinks at least 15 ml of alcoholic beverage daily					0.003	0.006	0.008	0.015
							(0.059)	(0.079)	(0.089)	(0.122)
Quit drinking	*calcohol_quit_cl*	=1 if index child already stopped drinking					0.191	0.223	0.115	0.191
							(0.393)	(0.416)	(0.319)	(0.393)
Index child's gender	*cmale_cl*	=1 if index child is male		0.527	0.519	0.518	0.530	0.526	0.552	0.519
				(0.499)	(0.500)	(0.500)	(0.499)	(0.499)	(0.497)	(0.500)
Household head gender	*genderhh_cl*	=1 if household head is male	0.936				0.823	0.796	0.817	0.752
			(0.245)				(0.382)	(0.403)	(0.387)	(0.432)
Household size	*hhsize_cl*	Size of the index child's household	5.637	6.990	7.240	7.062	6.693	6.295	5.959	5.783
			(2.812)	(2.326)	(2.505)	(2.535)	(2.639)	(2.664)	(2.763)	(2.775)
Household proportion of less than 1 y/o males	*prop_male_less1yo_cl*	Proportion of less than 1 y/o males in the index child's household	0.008	0.010	0.007	0.006	0.010	0.015	0.018	0.017
			(0.040)	(0.036)	(0.029)	(0.027)	(0.041)	(0.053)	(0.061)	(0.057)
Household proportion of 1–6 y/o males	*prop_male_oneto6yo_cl*	Proportion of 1–6 y/o males in the index child's household	0.132	0.093	0.065	0.041	0.033	0.041	0.070	0.088
			(0.154)	(0.111)	(0.093)	(0.073)	(0.070)	(0.090)	(0.122)	(0.131)
Household proportion of 7–14 y/o males	*prop_male_sevento14yo_cl*	Proportion of 7–14 y/o ma=es in the index child's household	0.060	0.183	0.188	0.104	0.074	0.048	0.032	0.031
			(0.102)	(0.137)	(0.143)	(0.115)	(0.104)	(0.084)	(0.072)	(0.069)
Household proportion of 15–24 y/o males	*prop_male_fifteento24yo_cl*	Proportion of 15–24 y/o males in the index child's household	0.113	0.054	0.084	0.192	0.225	0.228	0.210	0.078
			(0.156)	(0.093)	(0.114)	(0.149)	(0.163)	(0.161)	(0.171)	(0.117)
Household proportion of 25–59 y/o males	*prop_male_twentyfiveto59yo_cl*	Proportion of 25–59 y/o males in the index child's household	0.173	0.158	0.152	0.150	0.160	0.164	0.170	0.277
			(0.126)	(0.068)	(0.072)	(0.081)	(0.105)	(0.120)	(0.140)	(0.161)
N			*3,325*	*2,151*	*2,052*	*1,929*	*2,035*	*1,900*	*1,735*	*1,650*

Table 2b. Descriptive Statistics for Child-Level Independent Variables, continued

Covariate	*Stata name*	Description	Survey years							
			1983	1991	1994	1998	2002	2005	2007	2009
Household proportion of 60 y/o and above males	*prop_male_sixttyabove_cl*	Proportion of 60 y/o and above males in the index child's household	0.009 (0.036)	0.006 (0.028)	0.007 (0.029)	0.008 (0.035)	0.014 (0.050)	0.016 (0.054)	0.017 (0.058)	0.018 (0.057)
Household proportion of less than 1 y/o females	*prop_fem_less1yo_cl*	Proportion of less than 1 y/o females in the index child's household	0.006 (0.036)	0.010 (0.036)	0.007 (0.029)	0.006 (0.025)	0.008 (0.035)	0.013 (0.048)	0.014 (0.052)	0.018 (0.058)
Household proportion of 1–6 y/o females	*prop_fem_oneto6yo_cl*	Proportion of 1–6 y/o females in the index child's household	0.125 (0.150)	0.087 (0.107)	0.062 (0.089)	0.039 (0.072)	0.033 (0.070)	0.039 (0.084)	0.062 (0.109)	0.076 (0.125)
Household proportion of 7–14 y/o females	*prop_fem_sevento14yo_cl*	Proportion of 7–14 y/o females in the index child's household	0.059 (0.104)	0.170 (0.136)	0.176 (0.135)	0.142 (0.131)	0.069 (0.099)	0.047 (0.086)	0.030 (0.070)	0.028 (0.069)
Household proportion of 15–24 y/o females	*prop_fem_fifteento24yo_cl*	Proportion of 15–24 y/o females in the index child's household	0.156 (0.169)	0.049 (0.087)	0.072 (0.102)	0.125 (0.133)	0.191 (0.153)	0.208 (0.153)	0.200 (0.146)	0.099 (0.130)
Household proportion of 25–59 y/o females	*prop_fem_twentyfiveto59yo_cl*	Proportion of 25–59 y/o females in the index child's household	0.150 (0.127)	0.170 (0.066)	0.170 (0.064)	0.176 (0.071)	0.166 (0.095)	0.161 (0.113)	0.154 (0.135)	0.248 (0.165)
Household proportion of 60 y/o and above females	*prop_fem_sixttyabove_cl*	Proportion of 60 y/o and above females in the index child's household	0.011 (0.044)	0.010 (0.036)	0.011 (0.039)	0.011 (0.042)	0.018 (0.059)	0.020 (0.067)	0.021 (0.067)	0.022 (0.067)
Urbanity	*urban_cl*	1 if household is an urban barangay	0.768 (0.422)	0.739 (0.439)	0.726 (0.446)	0.714 (0.452)	0.741 (0.438)	0.704 (0.457)	0.695 (0.460)	0.706 (0.456)
N			*3,325*	*2,151*	*2,052*	*1,929*	*2,035*	*1,900*	*1,735*	*1,650*

Table 2b. Descriptive Statistics for Child-Level Independent Variables, continued

Covariate	*Stata name*	Description	Survey years							
			1983	1991	1994	1998	2002	2005	2007	2009
Index child's highest educational attainment	*chigheduc_cl*	No grade completed			0.022	0.005	0.003	0.002	0.002	0.001
		Elementary level			0.978	0.279	0.276	0.151	0.173	0.124
		High school level				0.716	0.574	0.568	0.618	0.509
		College level					0.147	0.279	0.207	0.363
		Post-graduate level							0.002	0.003
N			*3,325*	*2,151*	*2,052*	*1,929*	*333*	*1,900*	*672*	*1,529*
Index child's age	*chilage_cl*	Sample average index child's age		8.000	10.981	15.007	18.182	20.944	23.585	25.221
				(0.000)	(0.501)	(0.767)	(0.404)	(0.342)	(0.493)	(0.474)
N				*2,151*	*2,052*	*1,929*	*2,035*	*1,900*	*1,081*	*1,649*
Index child's smoking age	*csmoke_age_cl*	Sample average index child's age first tried smoking					15.238	15.687	17.154	17.433
							(2.305)	(2.563)	(3.372)	(3.613)
N							*1,040*	*1,133*	*902*	*1,000*
Index child's drinking age	*calcohol_age_cl*	Sample average index child's age first tried drinking					15.818	16.311	17.986	17.933
							(2.001)	(2.244)	(2.832)	(3.232)
N							*1,626*	*1,755*	*1,484*	*1,559*

Table 2c. Descriptive Statistics for Child-Level Birth Weight and BMI Classifications used in the interactions

Covariate	*Stata name*	Description	Survey year			
			2002	2005	2007	2009
Birth weight in centile[1]	*bwgt_lessthan2495*	less than 10th centile	0.103			
	bwgt_lessthan3175	more than 10th but less than 65th centile	0.487			
	bwgt_lessthan3856	more than 65th but less than 96th centile	0.375			
	bwgt_morethan3856	more than 96th centile	0.035			
Birth weight in quintiles	*birthwgt_quintile*	1st quintile	0.260			
		2nd quintile	0.157			
		3rd quintile	0.235			
		4th quintile	0.153			
		5th quintile	0.194			
Birth weight classification according to UNSW[2]	*birthwgt_categ3_cl*	Very low (<2,000 g)	0.013			
		Low (2,000g to <2,500 g)	0.090			
		Lower normal (2,500 g to <3,000 g)	0.329			
		Middle normal (3,000 g to <3,500 g)	0.392			
		Upper normal (3,500 g to <4,000 g)	0.149			
		High (4,000 g and above)	0.028			
N			*1,734*			
Child BMI in centile[3]	*cBMI_lessthan10th*	less than 10th centile	0.0925	0.1003	0.0944	0.0959
	cBMI_lessthan65th	more than 10th but less than 65th centile	0.5084	0.5488	0.5179	0.5279
	cBMI_lessthan96th	more than 65th but less than 96th centile	0.2862	0.3093	0.2918	0.2971
	cBMI_morethan96th	more than 96th centile	0.0367	0.0399	0.0374	0.0384
			2,205	*1,904*	*1,844*	*1,720*
Child BMI in quintiles[4]	*cBMI_quintile*	1st quintile	0.200	0.200	0.201	0.200
		2nd quintile	0.200	0.200	0.200	0.200
		3rd quintile	0.200	0.200	0.200	0.201
		4th quintile	0.200	0.200	0.200	0.200
		5th quintile	0.200	0.200	0.200	0.199
N			*2,037*	*1,901*	*1,736*	*1,650*

Notes: [1]These birth weight centiles were generated based on Rich-Edwards et al. (2005); [2]This birth weight classification was also used in Table 1 Run 4; [3]These BMI centiles correspond to the birth weight centiles based on Rich-Edwards et al. (2005); [4]These BMI quintiles correspond to the birth weight quintiles.

Table 3.1 Mother Simple Regression Probit Results (Individual survey years), 1991–2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	mheartd			mdiabet			mtuberc			mhyper_hosp		
1991												
Categorical Mother's BMI												
Underweight								0.03523**				
								(0.0148)				
Overweight											0.00764*	
											(0.0044)	
Obese class I												
Obese class II												
Mother's BMI							-0.00171***			0.00068***		
							(0.0004)			(0.0002)		
Mother is obese												
	mheartd			mdiabet			mtuberc			mCVD_ill		
1994												
Categorical Mother's BMI												
Underweight								0.01504*				
								(0.0080)				
Overweight											0.05547***	
											(0.0122)	
Obese class I		-0.03048*									0.10010***	
		(0.0172)									(0.0309)	
Obese class II												
Mother's BMI							-0.00121***			0.00623***		
							(0.0003)			(0.0009)		
Mother is obese												0.08507***
												(0.0292)

Table 3.1 Mother Simple Regression Probit Results (Individual survey years), 1991–2005, continued

	mheartd	mdiabet	mtuberc	mhyper
1998				
Categorical mothers BMI				
Underweight	-0.03404*		0.03390**	
	(0.0201)		(0.0147)	
Overweight		0.01365*		0.06672***
		(0.0078)		(0.0177)
Obese class I		0.03726*		0.16541***
		(0.0209)		(0.0416)
Obese class II				
Mother's BMI		-0.00165**	-0.00107***	-0.00984***
		(0.0008)	(0.0004)	(0.0017)
Mother is obese				0.12416***
				(0.0376)

Table 3.1 Mother Simple Regression Probit Results (Individual survey years), 1991–2005, continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	mheartd			mdiabet			mtuberc			mhyper		
2002												
Categorical mother's BMI												
Underweight		-0.03397*			-0.02383**							
		(0.0190)			(0.0122)						-0.07122***	
Overweight					-0.02120**						(0.0190)	
					(0.0087)						0.10397***	
Obese class I					-0.02752**						(0.0190)	
					(0.0117)						0.12241***	
Obese class II											(0.0341)	
Obese class III					0.62201**							
					(0.2723)							
Mother's BMI							-0.00118***			0.01414***		
							(0.0004)			(0.0018)		
Mother is obese												0.09279***
												(0.0319)
2005												
Categorical mother's BMI												
Underweight								0.04325***			-0.06707***	
								(0.0161)			(0.0255)	
Overweight											0.04961**	
											(0.0200)	
Obese class I											0.16393***	
											(0.0385)	
Obese class II											0.16799*	
											(0.0970)	
Obese class III												
Mother's BMI				0.00304***			-0.00104***			0.01441***		
				(0.0010)			(0.0004)			(0.0020)		
Mother is obese												0.15165***
												(0.0351)

Notes: The following variables were included in the regressions for years 2002 and 2005 but excluded in the presentation of tables for brevity: (a) mother's smoking behavior (smoking daily and quit smoking); (b) indicator for raised blood pressure; (c) drinking behavior (whether currently drinking, drinking daily (for 2002 only), and quit drinking); and indicators for alcoholic drinks consumed (tuba. gin, wine, rum. others). The complete regression results can be found in Appendix A.

Table 3.2 Mother Multiple Regression Probit Results (Individual survey years), 1991–2005

	(1) mBMI_cl	(2) mBMI_categ_cl	(3) mobese2_cl	(4) mBMI_cl	(5) mBMI_categ_c	(6) mobese2_cl	(7) mBMI_cl	(8) mBMI_categ_cl	(9) mobese2_cl	(10) mBMI_cl	(11) mBMI_categ_cl	(12) mobese2_cl
	mheartd			mdiabet			mtuberc			mhyper_hosp		
1991												
Categorical mother's BMI												
Underweight								0.03456**				
								(0.0147)				
Overweight											0.00873*	
											(0.0049)	
Obese class I												
Obese class II												
Mother's BMI							-0.00234***			0.00114***		
							(0.0008)			(0.0004)		
Mother is obese												
	mheartd			mdiabet			mtuberc			mCVD_ill		
1994												
Categorical mother's BMI												
Underweight											-0.00985	
											(0.0122)	
Overweight											0.04845***	
											(0.0130)	
Obese class I		-0.04575***									0.08521***	
		(0.0171)									(0.0295)	
Obese class II												
Mother's BMI	-0.00288**						-0.00231***			0.00651***		
	(0.0014)						(0.0009)			(0.0012)		
Mother is obese			-0.02126*						-0.01340*			0.05017***
			(0.0123)						(0.0075)			(0.0099)

Notes: The following variables were included in the regressions for years 1991 and 1994 but excluded in the presentation of tables for brevity: (a) mother's age; (b) mother's highest educational attainment (no grade, high school, college, post-graduate); (c) household size; (d) household proportion variables; and (e) indicator for urbanity. The complete regression results can be found in Appendix A.

Table 3.2 Mother Multiple Regression Probit Results (Individual survey years), 1991–2005, continued

	(1) mBMI_cl	(2) mBMI_categ_cl	(3) mobese2_cl	(4) mBMI_cl	(5) mBMI_categ_cl	(6) mobese2_cl	(7) mBMI_cl	(8) mBMI_categ_cl	(9) mobese2_cl	(10) mBMI_cl	(11) mBMI_categ_cl	(12) mobese2_cl
	mheartd			mdiabet			mtuberc			mhyper		
1998												
Categorical Mother's BMI												
Underweight		-0.03742*						0.04101**			-0.04213**	
		(0.0196)						(0.0191)			(0.0174)	
Overweight											0.07423***	
											(0.0177)	
Obese class I					0.03518*						0.16862***	
					(0.0206)						(0.0408)	
Obese class II												
Mother's BMI				0.00173**			-0.00312***			0.01126**		
				(0.0008)			(0.0011)			(0.0017)		
Mother is obese						0.01859*						0.10030**
						(0.0106)						(0.0242)

Notes: The following variables were included in the regressions for the year 1998 but excluded in the presentation of tables for brevity: (a) mother's age; (b) mother's highest educational attainment (no grade, high school, college, post-graduate); (c) household size; (d) household proportion variables; and (e) indicator for urbanity. The complete regression results can be found in Appendix A.

Table 3.2 Mother Multiple Regression Probit Results (Individual survey years), 1991–2005, continued

	(1) mBMI_cl	(2) mBMI_categ_cl	(3) mobese2_cl	(4) mBMI_cl	(5) mBMI_categ_cl	(6) mobese2_cl	(7) mBMI_cl	(8) mBMI_categ_cl	(9) mobese2_cl
	mheartd			mdiabet			mhyper		
2002									
Categorical mother's BMI									
Underweight		-0.06765***							
		(0.0204)							
Overweight								0.06010**	
								(0.0277)	
Obese class I									
Obese class II									
Mother's BMI							0.00740**		
							(0.0029)		
Mother is obese									
Mother has raised blood pressure							0.18232***	0.18382***	0.19982***
							(0.0234)	(0.0235)	(0.0231)
Mother smokes daily									
Mother quit smoking									
Kinds of alcoholic beverage mother drinks									
Tuba									
Gin									
Rum								0.07967*	0.09264**
								(0.0452)	(0.0463)
Wine									
Others				0.19557**	0.18151*	0.19529**			
				(0.0993)	(0.0965)	(0.0996)			

Notes: The following variables were included in the regressions for the year 2002 but excluded in the presentation of tables for brevity: (a) drinking behavior (whether currently drinking or quit drinking); (b) mother's age; (c) mother's highest educational attainment (no grade, high school, college, post-graduate); (d) household size; (e) household proportion variables; and (f) indicator for urbanity. The complete regression results can be found in Appendix A.

Table 3.2 Mother Multiple Regression Probit Results (Individual survey years), 1991–2005, continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	mBMI_cl	mBMI_categ_cl	mobese2_cl	mBMI_cl	mBMI_categ_cl	mobese2_cl	mBMI_cl	mBMI_categ_cl	mobese2_cl	mBMI_cl	mBMI_categ_cl	mobese2_cl
	mheartd			mdiabet			mtuberc			mhyper		
2005												
Categorical mother's BMI												
Underweight												
Overweight												
Obese class I												
Obese class II												
Mother's BMI										0.00518*		
										(0.0030)		
Mother is obese			0.05575**									
			(0.0284)									
Mother has raised blood pressure										0.22862***	0.23121***	0.23461***
										(0.0231)	(0.0231)	(0.0229)
Mother smokes daily												
Mother quit smoking												
Kinds of alcoholic beverage mother drinks												
Tuba				-0.03189*	-0.03199*	-0.03128*						
				(0.0191)	(0.0183)	(0.0187)						
Gin	-0.04645**	-0.04516*	-0.04314*									
	(0.0229)	(0.0237)	(0.0246)									
Rum										0.18579***	0.18402***	0.18689***
										(0.0606)	(0.0607)	(0.0609)
Wine				-0.03193*	-0.02853	-0.03044*						
				(0.0169)	(0.0183)	(0.0174)						
Others												

Notes: The following variables were included in the regressions for the year 2005 but excluded in the presentation of tables for brevity: (a) Obese class III (omitted); (b) drinking behavior (whether currently drinking or quit drinking); (c) mother's age; (d) mother's highest educational attainment (no grade, high school, college, post-graduate); (e) household size; (f) household proportion variables; and (g) indicator for urbanity. The complete regression results can be found in Appendix A.

Table 4.1 Child Simple Regression Probit Results for Year 1991

Variables	(1) Child has tuberculosis	(2)
Child's birth weight	-0.00000	
	(0.0000)	
Birth weight classification *(Base: >2,495 g to 3,175 g)*		
<2,268 g		-0.00160
		(0.0108)
2,268 g to 2,495 g		0.00655
		(0.0133)
>3,175 g to 3,856 g		0.00063
		(0.0054)
>3,856 g to 4,536 g		-
>4,536 g		-
Observations	1,931	1,863

Table 4.1 Child Simple Regression probit results for year 1994

Variables	(1) Child was hospitalized due to tuberculosis	(2) Child was hospitalized due to heart disease
Child's birth weight	-0.00000	0.00000
	(0.0000)	(0.0000)
Observations	1,863	1,863

Table 4.1 Child Simple Regression probit results for year 1998

Variables	(1) Child has heart disease	(2) Child has cardiovascular ailment
Child's birth weight	0.00000	0.00000
	(0.0000)	(0.0000)
Observations	1,785	1,785

Table 4.1 Child Simple Regression Probit Results for Year 2002

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables	Child has respiratory ailment					Child has chronic respiratory ailment				
Categorical child's BMI *(Base: normal)*										
Underweight	0.04121*					0.02651**				
	(0.0225)					(0.0115)				
Overweight	-0.03058					0.01500				
	(0.0434)					(0.0230)				
Obese class I	0.15292					0.03012				
	(0.1271)					(0.0646)				
Obese class II	-					-				
Obese class III	-					-				
Child's BMI		-0.00363					-0.00275			
		(0.0036)					(0.0020)			
Child is obese			0.09601					0.01427		
			(0.1163)					(0.0573)		
Child's birth weight				-0.00001					-0.00001	
				(0.0000)					(0.0000)	
Birth weight classification *(Base: >2,495 g to 3,175 g)*										
<2,268 g					-0.01966					-0.01212
					(0.0479)					(0.0207)
2,268 g to 2,495 g					0.06393					0.05379*
					(0.0515)					(0.0324)
>3,175 g to 3,856 g					0.00899					-0.00781
					(0.0230)					(0.0104)
>3,856 g to 4,536 g					-0.07972					-0.02835
					(0.0534)					(0.0191)
>4,536 g					0.14171					0.15379
					(0.2197)					(0.1791)
Observations	2,035	2,037	2,037	1,734	1,734	2,035	2,037	2,037	1,734	1,734

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure and drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank). The complete regression results can be found in Appendix B.

Table 4.1 Child Simple Regression Probit Results for Year 2002, continued

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Variables	Child was hospitalized due to respiratory ailment				Child has heart disease			Child has cardiovascular ailment				
Categorical child's BMI *(Base: normal)*												
Underweight	-0.00194				0.00141			0.00141				
	(0.0059)				(0.0028)			(0.0028)				
Overweight	0.00644											
	(0.0169)											
Obese class I								0.06447				
								(0.0644)				
Obese class II					-			-				
Obese class III	-				-			-				
Child's BMI		0.00066				-0.00011			0.00040			
		(0.0009)				(0.0004)			(0.0004)			
Child is obese										0.05635		
										(0.0571)		
Child's birth weight			-0.00001				-0.00000				-0.00000	
			(0.0000)				(0.0000)				(0.0000)	
Birth weight classification *(Base: >2,495 g to 3,175 g)*												
<2,268 g												0.00899
												(0.0114)
2,268 g to 2,495 g				0.04639								
				(0.0293)								
>3,175 g to 3,856 g				0.00179								-0.00083
				(0.0051)								(0.0023)
>3,856 g to 4,536 g												
>4,536 g												
Observations	1,302	1,313	1,138	1,041	1,923	2,037	1,734	1,938	2,037	2,037	1,734	1,583

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure and drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank). The complete regression results can be found in Appendix B.

Table 4.1 Child Simple Regression Probit Results for Year 2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables	Child has respiratory ailment					Child has chronic respiratory ailment				
Categorical child's BMI *(Base: normal)*										
Underweight	0.02235					0.02429**				
	(0.0188)					(0.0121)				
Overweight	-0.02273					-0.02225***				
	(0.0255)					(0.0086)				
Obese class I	0.08263					0.12435*				
	(0.0778)					(0.0709)				
Obese class II	0.14032									
	(0.2167)									
Obese class III	-					-				
Child's BMI		-0.00157					-0.00173			
		(0.0025)					(0.0017)			
Child is obese			0.07461					0.09183		
			(0.0694)					(0.0586)		
Child's birth weight				0.00001					-0.00000	
				(0.0000)					(0.0000)	
Birth weight classification *(Base: >2,495 g to 3,175 g)*										
<2,268 g					-0.03817					-0.01572
					(0.0312)					(0.0136)
2,268 g to 2,495 g					0.02356					0.04601
					(0.0397)					(0.0297)
>3,175 g to 3,856 g					-0.00040					0.00977
					(0.0170)					(0.0097)
>3,856 g to 4,536 g					0.05757					-0.00919
					(0.0528)					(0.0196)
>4,536 g					-					-
Observations	1,899	1,901	1,901	1,612	1,607	1,895	1,901	1,901	1,612	1,607

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure and drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank). The complete regression results can be found in Appendix B.

Table 4.1 Child Simple Regression Probit Results for Year 2005, continued

	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Variables	Child was hospitalized due to respiratory ailment					Child has cardiovascular ailment			
Categorical child's BMI *(Base: normal)*									
Underweight	-0.01252					-0.00134			
	(0.0131)					(0.0030)			
Overweight									
Obese class I	0.06368								
	(0.0871)								
Obese class II	0.47277								
	(0.3540)								
Obese class III						-			
Child's BMI		0.00324*					0.00013		
		(0.0017)					(0.0003)		
Child is obese			0.13128						
			(0.1003)						
Child'' birth weight				-0.00001				-0.00000	
				(0.0000)				(0.0000)	
Birth weight classification *(Base: >2,495 g to 3,175 g)*									
<2,268 g					0.04095				
					(0.0613)				
2,268 g to 2,495 g					0.01691				
					(0.0389)				
>3,175 g to 3,856 g					0.00237				-0.00091
					(0.0142)				(0.0024)
>3,856 g to 4,536 g									
>4,536 g					-				-
Observations	553	589	589	502	483	1,731	1,901	1,612	1,392

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure and drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank). The complete regression results can be found in Appendix B.

Table 4.1 Child Simple Regression Probit Results for Year 2007

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variables	Child has respiratory ailment					Child was hospitalized due to respiratory ailment			
Categorical child's BMI *(Base: normal)*									
Underweight	0.01448					0.01694*			
	(0.0188)					(0.0098)			
Overweight	-0.02949					0.01073			
	(0.0290)					(0.0184)			
Obese class I	0.16022								
	(0.1031)								
Obese class II	0.11022								
	(0.2168)								
Obese class III	-								
Child's BMI		-0.00045					-0.00118		
		(0.0026)					(0.0014)		
Child is obese			0.12713						
			(0.0874)						
Child's birth weight				0.00001				0.00001	
				(0.0000)				(0.0000)	
Birth weight classification *(Base: >2,495 g to 3,175 g)*									
<2,268 g					0.00357				
					(0.0402)				
2,268 g to 2,495 g					0.05583				0.00187
					(0.0455)				(0.0209)
>3,175 g to 3,856 g					0.02766				0.00193
					(0.0199)				(0.0106)
>3,856 g to 4,536 g					-0.03929				
					(0.0443)				
>4,536 g					0.06071				
					(0.1794)				
Observations	1,734	1,736	1,736	1,563	1,563	879	895	820	735

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure and drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank). The complete regression results can be found in Appendix B.

Table 4.1 Child Simple Regression Probit Results for Year 2007, continued

	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
Variables	Child has cardiovascular ailment				Child was hospitalized due to cardiovascular ailment				Child has diabetes			
Categorical child's BMI *(Base: normal)*												
Underweight	0.00139								0.00084			
	(0.0043)								(0.0021)			
Overweight	0.01619				0.01446				0.00638			
	(0.0128)				(0.0182)				(0.0074)			
Obese class I												
Obese class II												
Obese class III	-								-			
Child's BMI		0.00031				0.00055*				0.00019		
		(0.0006)				(0.0003)				(0.0002)		
Child is obese												
Child's birth weight			-0.00001				-0.00000				-0.00000*	
			(0.0000)				(0.0000)				(0.0000)	
Birth weight classification *(Base: >2,495 g to 3,175 g)*												
<2,268 g				0.00008								0.01059
				(0.0125)								(0.0119)
2,268 g to 2,495 g				0.00037								0.01088
				(0.0127)								(0.0122)
>3,175 g to 3,856 g				-0.01011**				-0.00184				
				(0.0043)				(0.0050)				
>3,856 g to 4,536 g				0.00817								
				(0.0202)								
>4,536 g												
Observations	1,710	1,736	1,563	1,558	592	895	820	685	1,710	1,736	1,563	927

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, quit smoking, and age first smoked); (b) indicator for raised blood pressure and drinking behavior (whether currently drinking, drinking daily, quit drinking, and age first drank). The complete regression results can be found in Appendix B.

Table 4.1 Child Simple Regression Probit Results for Year 2009

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Child has respiratory ailment					Child was hospitalized due to respiratory ailment				Child has heart disease			
Categorical child's BMI *(Base: normal)*													
Underweight	0.04290					-0.00211				0.00554			
	(0.0383)					(0.0064)				(0.0074)			
Overweight	-0.06414*					-0.00340							
	(0.0330)					(0.0053)							
Obese class I	0.06148												
	(0.0675)												
Obese class II	0.09720												
	(0.1719)												
Obese class III	-									-			
Child's BMI		-0.00476					-0.00024				-0.00039		
		(0.0033)					(0.0005)				(0.0004)		
Child is obese			0.05429										
			(0.0621)										
Child's birth weight				-0.00006**				-0.00000				-0.00000	
				(0.0000)				(0.0000)				(0.0000)	
Birth weight classification *(Base: >2,495 g to 3,175 g)*													
<2,268 g					0.08820								
					(0.0583)								
2,268 g to 2,495 g					0.00913				0.03912				0.00438
					(0.0590)				(0.0251)				(0.0130)
>3,175 g to 3,856 g					-0.02958				0.00214				-0.00641*
					(0.0285)				(0.0050)				(0.0038)
>3,856 g to 4,536 g					-0.05691								0.01346
					(0.0760)								(0.0218)
>4,536 g					-0.33517*								
					(0.1799)								
Observations	1,648	1,650	1,650	1,468	1,468	1,296	1,347	1,198	1,088	1,295	1,650	1,468	1,386

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure and drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank). The complete regression results can be found in Appendix B.

Table 4.1 Child Simple Regression Probit Results for Year 2009, continued

	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Variables	Child has hypertension					Child was hospitalized due to cardiovascular ailment			
Categorical child's BMI *(Base: normal)*									
Underweight									
Overweight	0.00510								
	(0.0050)								
Obese class I	0.03389								
	(0.0248)								
Obese class II									
Obese class III	-								
Child's BMI		0.00058**					0.00005		
		(0.0002)					(0.0000)		
Child is obese			0.02778						
			(0.0211)						
Child's birth weight				-0.00000**				-0.00000*	
				(0.0000)				(0.0000)	
Birth weight classification *(Base: >2,495–3,175 g)*									
<2,268 g					0.00609				0.01095
					(0.0133)				(0.0144)
2,268 g to 2,495 g									0.01137
									(0.0148)
>3,175 g to 3,856 g									
>3,856 g to 4,536 g									
>4,536 g									
Observations	1,442	1,650	1,650	1,468	802	43	1,347	1,198	738

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure and drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank). The complete regression results can be found in Appendix B.

Table 4.1 Child Simple Regression Probit Results for Year 2009, continued

Variables	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)
	Child has cardiovascular ailment					Child has diabetes				
Categorical child's BMI *(Base: normal)*										
Underweight	0.00372									
	(0.0075)									
Overweight	0.00054					0.00582				
	(0.0054)					(0.0063)				
Obese class I	0.02933									
	(0.0249)									
Obese class II						0.12044				
						(0.1170)				
Obese class III	-					-				
Child's BMI		0.00075					0.00081***			
		(0.0005)					(0.0003)			
Child is obese			0.02336					0.01010		
			(0.0212)					(0.0151)		
Child's birth weight				-0.00001					-0.00001**	
				(0.0000)					(0.0000)	
Birth weight classification *(Base: >2,495 g to 3,175 g)*										
<2,268 g					-0.00081					0.00747
					(0.0136)					(0.0132)
2,268 g to 2,495 g					-0.00113					0.00714
					(0.0133)					(0.0129)
>3,175 g to 3,856 g					-0.01193**					
					(0.0047)					
>3,856 g to 4,536 g					0.00795					
					(0.0219)					
>4,536 g										
Observations	1,640	1,650	1,650	1,468	1,463	1,394	1,650	1,650	1,468	881

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure and drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank). The complete regression results can be found in Appendix B.

Table 4.2 Child Multiple Regression Probit

Results for Year 1991	(1)	(2)
Variables	Child has tuberculosis	
Child's birth weight	-0.00001	
	(0.0000)	
Birth weight classification *(Base outcome: >2,495 g to 3,175 g)*		
<2,268 g		-0.00071
		(0.0157)
2,268 g to 2,495 g		0.00983
		(0.0186)
>3,175 g to 3,856 g		-0.00516
		(0.0067)
>3,856 g to 4,536 g		-
>4,536 g		-
Observations	1,375	1,321

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) gender of the child; (b) household size; and (c) indicator for urbanity of the household. The complete regression results can be found in Appendix B.

Table 4.2 Child Multiple Regression probit results for year 1994

	(1)	(2)
Variables	Child was hospitalized due to tuberculosis	Child was hospitalized due to heart disease
Child's birth weight	-0.00000	0.00001
	(0.0000)	(0.0000)
Birth weight classification *(Base outcome: >2,495 g to 3,175 g)*		
<2,268 g		
2,268 g to 2,495 g		
>3,175 g to 3,856 g		
>3,856 g to 4,536 g		
>4,536 g		
Observations	666	666

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) gender of the child; (b) household size; (c) indicator for urbanity of the household; and (d) age of the child. The complete regression results can be found in Appendix B.

Table 4.2 Child Multiple Regression Probit Results for

Year 1998 Variables	(1) Child has heart disease	(2) Child has cardiovascular ailment
Child's birth weight	0.00001	0.00001
	(0.0000)	(0.0000)
Birth weight classification *(Base outcome: >2,495–3,175 g)*		
<2,268 g		
2,268 g to 2,495 g		
>3,175 g to 3,856 g		
>3,856 g to 4,536 g		
>4,536 g		
Observations	339	154

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) gender of the child; (b) household size; (c) indicator for urbanity of the household; and (d) age of the child. The complete regression results can be found in Appendix B.

Table 4.2 Child Multiple Regression Probit Results for Year 2002

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Child has respiratory illness						Child has a chronic respiratory illness					
	cBMI_categ_cl_02		cBMI_cl_02		obese2_cl_02		cBMI_categ_cl_02		cBMI_cl_02		obese2_cl_02	
Categorical child's BMI *(Base outcome: Normal)*												
Underweight	0.03214	0.03475					0.02038	0.02222				
	(0.0370)	(0.0368)					(0.0172)	(0.0176)				
Overweight	-0.05852	-0.04404					-0.01475	-0.01060				
	(0.0667)	(0.0695)					(0.0210)	(0.0242)				
Obese class I	0.08807	0.10194					0.13647	0.14025				
	(0.1964)	(0.1955)					(0.1700)	(0.1688)				
Obese class II	-	-					-	-				
Obese class III												
Child's BMI			-0.00423	-0.00369					-0.00182	-0.00173		
			(0.0060)	(0.0060)					(0.0034)	(0.0035)		
Child is obese					0.03614	0.05039					0.06080	0.06322
					(0.1644)	(0.1614)					(0.0560)	(0.0559)
Child's birth weight	-0.00002		-0.00003		-0.00003		-0.00001		-0.00001		-0.00001	
	(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)	
Birth weight classification *(Base outcome: >2,495 g to 3,175 g)*												
<2,268 g		0.09119		0.09354		0.09512		0.01175		0.01178		0.01271
		(0.0711)		(0.0712)		(0.0714)		(0.0324)		(0.0319)		(0.0323)
2,268 g to 2,495 g		0.13163		0.13422*		0.13676*		0.05144		0.05473		0.05627
		(0.0802)		(0.0803)		(0.0806)		(0.0409)		(0.0424)		(0.0428)
>3,175 g to 3,856 g		0.03258		0.03236		0.03271		0.00748		0.00843		0.00765
		(0.0329)		(0.0328)		(0.0328)		(0.0142)		(0.0143)		(0.0141)
>3,856 g to 4,536 g		-0.11114		-0.11236		-0.11298						
		(0.0727)		(0.0724)		(0.0724)						
>4,536 g		0.44449*		0.43688*		0.43708*		0.20377		0.17977		0.18318
		(0.2497)		(0.2532)		(0.2526)		(0.2492)		(0.2348)		(0.2385)
Observations	836	836	837	837	837	837	829	805	830	806	830	806

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure; (c) drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank); (d) gender of the child; (e) gender of the household head; (f) household size; and (g) age of the child. The complete regression results can be found in Appendix B.

Table 4.2 Child Multiple Regression Probit Results for Year 2002, continued

Variables	(13)	(14)	(15)	(16)	(17)	(18)
	Child was hospitalized due to respiratory ailment					
	cBMI_categ_cl_02		cBMI_cl_02		obese2_cl_02	
Categorical child's BMI *(Base outcome: Normal)*						
Underweight		-0.01461**				
		(0.0066)				
Overweight						
Obese class I						
Obese class II						
Obese class III						
Child's BMI			0.00104	0.00167		
			(0.0008)	(0.0012)		
Child is obese						
Child's birth weight			-0.00001		-0.00001	
			(0.0000)		(0.0000)	
Birth weight classification *(Base outcome: >2,495 g to 3,175 g)*						
<2,268 g						
2,268 g to 2,495 g		0.10369*		0.08808		0.07853
		(0.0595)		(0.0568)		(0.0521)
>3,175 g to 3,856 g		0.00727		0.00785		0.00745
		(0.0063)		(0.0069)		(0.0062)
>3,856 g to 4,536 g						
>4,536 g						
Observations		481	555	505	552	502

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure; (c) drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank); (d) gender of the child; (e) gender of the household head; (f) household size; and (g) age of the child. The complete regression results can be found in Appendix B.

Table 4.2 Child Multiple Regression Probit Results for Year 2005

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Child has respiratory illness						Child has a chronic respiratory illness					
	cBMI_categ_cl_05		cBMI_cl_05		obese2_cl_05		cBMI_categ_cl_05		cBMI_cl_05		obese2_cl_05	
Categorical Child's BMI *(Base outcome: Normal)*												
Underweight	0.02480	0.02338					0.04317**					
	(0.0304)	(0.0301)					(0.0190)					
Overweight	-0.00992	-0.00701					-					
	(0.0368)	(0.0377)										
Obese class I	0.08738	0.08452					0.19105**					
	(0.0971)	(0.0961)					(0.0974)					
Obese class II	-	-					-					
Obese class III	-	-					-					
Child's BMI			-0.00186	-0.00172					-0.00140	-0.00172		
			(0.0037)	(0.0036)					(0.0024)	(0.0036)		
Child is obese					0.05449	0.05202					0.06409***	0.05202
					(0.0682)	(0.0683)					(0.0223)	(0.0683)
Child's birth weight	0.00001		0.00001		0.00001		0.00001		0.00000		0.00000	
	(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)	
Birth weight classification *(Base outcome: >2,495 g to 3,175 g)*												
<2,268 g		-0.03869		-0.03974		-0.03859				-0.03974		-0.03859
		(0.0399)		(0.0394)		(0.0397)				(0.0394)		(0.0397)
2,268 g to 2,495 g		-0.00493		-0.00488		-0.00862				-0.00488		-0.00862
		(0.0512)		(0.0510)		(0.0524)				(0.0510)		(0.0524)
>3,175 g to 3,856 g		0.00890		0.00946		0.00855				0.00946		0.00855
		(0.0236)		(0.0236)		(0.0234)				(0.0236)		(0.0234)
>3,856 g to 4,536 g		-0.00237		-0.00530		-0.00509				-0.00530		-0.00509
		(0.0679)		(0.0667)		(0.0667)				(0.0667)		(0.0667)
>4,536 g		-		-		-				-		-
Observations	945	942	948	945	948	945	856		936	945	936	945

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure; (c) drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank); (d) gender of the child; (e) gender of the household head; (f) household size; and (g) age of the child. The complete regression results can be found in Appendix B.

table 4.2 Child Multiple Regression Probit Results for Year 2005, continued

Variables	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
	Child was hospitalized due to respiratory ailment						Child has cardiovascular ailment					
	cBMI_categ_cl_05		cBMI_cl_05		obese2_cl_05		cBMI_categ_cl_05		cBMI_cl_05		obese2_cl_05	
Categorical child's BMI *(Base outcome: Normal)*												
Underweight	-0.01257	-0.01036					0.00349	0.00330				
	(0.0188)	(0.0233)					(0.0039)	(0.0039)				
Overweight	-						-					
Obese class I	-						-					
Obese class II							-	-				
Obese class III							-	-				
Child's BMI			-0.00854**	-0.01044**					-0.00033	-0.00040		
			(0.0043)	(0.0051)					(0.0003)	(0.0004)		
Child is obese					-						-	
Child's birth weight	-0.00001		0.00000		-0.00001		0.00000		0.00000		0.00000	
	(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)	
Birth weight classification *(Base outcome: >2,495 g to 3,175 g)*												
<2,268 g												
2,268 g to 2,495 g												
>3,175 g to 3,856 g		-0.01013		-0.00369		-0.00983		0.00106		0.00109		0.00080
		(0.0224)		(0.0203)		(0.0218)		(0.0031)		(0.0028)		(0.0028)
>3,856 g to 4,536 g												
>4,536 g		-		-		-		-		-		-
Observations	225	202	241	216	238	213	624	533	683	587	677	581

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, quit smoking, and age first smoked); (b) indicator for raised blood pressure; (c) drinking behavior (whether currently drinking, drinking daily, quit drinking, and age first drank); (d) gender of the child; (e) gender of the household head; (f) household size; and (g) age of the child. The complete regression results can be found in Appendix B.

Table 4.2 Child Multiple Regression PROBIT RESULTS for Year 2007

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
	Child has respiratory illness						Child has diabetes						
	cBMI_categ_cl_07		cBMI_cl_07		obese2_cl_07		cBMI_categ_cl_07		cBMI_cl_07		obese2_cl_07		
Categorical child's BMI *(Base outcome: Normal)*													
Underweight	0.06771	0.06596						-					
	(0.0439)	(0.0437)											
Overweight	-0.02155	-0.01632						0.11366	0.16529				
	(0.0656)	(0.0654)						(0.0000)	(0.0000)				
Obese class I	0.12728	0.13365						-					
	(0.1718)	(0.1720)											
Obese class II	-	-						-	-				
Obese class III			-0.00654		-0.00571					0.00385	0.02286*		
			(0.0058)		(0.0058)					(0.0024)	(0.0136)		
Child is obese						0.06831	0.07350					-	
						(0.1305)	(0.1295)						
Child's birth weight	0.00002		0.00002			0.00002		-0.00000		- 0.00003*		-0.00002	
	(0.0000)		(0.0000)			(0.0000)		(0.0000)		(0.0000)		(0.0000)	
Birth weight classification *(Base outcome: >2,495 g to 3,175 g)*													
<2,268 g			0.04224		0.04481		0.04606		0.11111		0.03037		0.035
			(0.0852)		(0.0858)		(0.0851)		(0.0000)		(0.0282)		(0.037
2,268 g to 2,495 g			0.12387		0.11457		0.12221						
			(0.0951)		(0.0948)		(0.0948)						
>3,175 g to 3,856 g			0.04117		0.04405		0.04615						
			(0.0393)		(0.0395)		(0.0392)						
>3,856 g to 4,536 g			-0.03089		-0.03998		-0.04431						
			(0.0979)		(0.0943)		(0.0916)						
>4,536 g			0.36744		0.34360		0.34707						
			(0.3816)		(0.3878)		(0.3811)						
Observations	474		474	475	475	475	475	130	54	185	81	182	80

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) cl currently smoking, smoking daily, or quit smoking, and age first smoked); (b) drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank); (c) gender of the child; (d) gender of the household head; (e) household size; and (f) age of the child. The complete regression results can be found in Appendix B.

Table 4.2 Child Multiple Regression Probit Results for Year 2009

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Child has respiratory illness						Child was hospitalized due to respiratory ailment					
	cBMI_categ_cl_09		cBMI_cl_09		obese2_cl_09		cBMI_categ_cl_09		cBMI_cl_09		obese2_cl_09	
Categorical child's BMI *(Base outcome: Normal)*												
Underweight	-0.00416	-0.00640										
	(0.0562)	(0.0563)										
Overweight	-0.09085**	-0.09088**										
	(0.0447)	(0.0447)										
Obese class I	0.07031	0.05970										
	(0.0863)	(0.0875)										
Obese class II	0.12005	0.12547										
	(0.1851)	(0.1841)										
Obese class III	-	-										
Child's BMI			-0.00078	-0.00093					-0.00051	-0.00044		
			(0.0046)	(0.0046)					(0.0004)	(0.0004)		
Child is obese					0.09033	0.08316					-	
					(0.0800)	(0.0804)						
Child's birth weight	-0.00005		-0.00005		-0.00005				-0.00000		-0.00000	
	(0.0000)		(0.0000)		(0.0000)				(0.0000)		(0.0000)	
Birth weight classification *(Base outcome: >2,495 g to 3,175 g)*												
<2,268 g		0.02278		0.02267		0.02275						
		(0.0770)		(0.0767)		(0.0769)						
2,268 g to 2,495 g		0.02374		0.02613		0.03040				0.02378		0.02504
		(0.0783)		(0.0785)		(0.0782)				(0.0220)		(0.0226)
>3,175 g to 3,856 g		-0.04683		-0.04856		-0.05036				0.00117		0.00096
		(0.0371)		(0.0372)		(0.0370)				(0.0048)		(0.0050)
>3,856 g to 4,536 g		0.00833		0.01211		-0.00004						
		(0.1107)		(0.1114)		(0.1124)						
>4,536 g		-0.32641		-0.33626*		-0.33317*						
		(0.2020)		(0.1903)		(0.1927)						
Observations	839	839	840	840	840	840			622	565	601	545

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure; (c) drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank); (d) gender of the child; (e) gender of the household head; (f) household size; and (g) age of the child. The complete regression results can be found in Appendix B.

Table 4.2 Child Multiple Regression Probit Results for Year 2009, continued

Variables	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
	Child has heart disease						Child has hypertension					
	cBMI_categ_cl_09			cBMI_cl_09		obese2_cl_09	cBMI_categ_cl_09			cBMI_cl_09		obese2_cl_09
Categorical child's BMI *(Base outcome: Normal)*												
Underweight							-					
Overweight							-					
Obese class I							-					
Obese class II							-					
Obese class III							-					
Child's BMI				0.00022						0.00599	0.01287	
				(0.0003)						(0.0000)	(0.0000)	
Child is obese						-						0.02221*
												(0.0116)
Child's birth weight				-0.00001*		-0.00001		-0.00000		-0.00004		-0.00002**
				(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)
Birth weight classification *(Base outcome: >2,495 g to 3,175 g)*												
<2,268 g											0.09502	
											(0.0000)	
2,268 g to 2,495 g												
>3,175 g to 3,856 g												
>3,856 g to 4,536 g												
>4,536 g												
Observations				538		518		84		402	221	402

												0.03410*
												(0.0182)
												-0.00002**
												(0.0000)
												0.01777*
												(0.0105)
												221

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, or quit smoking, and age first smoked); (b) indicator for raised blood pressure; (c) drinking behavior (whether currently drinking, drinking daily, or quit drinking, and age first drank); (d) gender of the child; (e) gender of the household head; (f) household size; and (g) age of the child. The complete regression results can be found in Appendix B.

Table 4.2 Child Multiple Regression Probit Results for Year 2009, continued

Variables	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)
	Child has cardiovascular ailment						Child has diabetes					
	cBMI_categ_cl_09		cBMI_cl_09		obese2_cl_09		cBMI_categ_cl_09		cBMI_cl_09		obese2_cl_09	
Categorical child's BMI *(Base outcome: Normal)*												
Underweight	-						-					
Overweight	-0.00124	-0.00071					0.00079	0.00361				
	(0.0089)	(0.0166)					(0.0049)	(0.0091)				
Obese class I	0.02983	0.04478					-					
	(0.0279)	(0.0485)										
Obese class II	-						0.11815	0.36194*				
							(0.0738)	(0.1883)				
Obese class III	-	-					-	-				
Child's BMI			0.00185**	0.00323**					0.00108	0.00202*		
			(0.0009)	(0.0016)					(0.0007)	(0.0011)		
Child is obese					0.01450*	0.02362					0.00683	0.01236
					(0.0086)	(0.0161)					(0.0094)	(0.0167)
Child's birth weight	-0.00002**		-0.00002**		-0.00002**		-0.00003**		-0.00002**		-0.00002**	
	(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)		(0.0000)	
Birth weight classification *(Base outcome: >2,495 g to 3,175 g)*												
<2,268 g		-0.00242		0.00004		-0.00183		0.05721**		0.02224		0.02483
		(0.0150)		(0.0150)		(0.0132)		(0.0243)		(0.0183)		(0.0216)
2,268 g to 2,495 g								0.02821		0.03772		0.02654
								(0.0217)		(0.0273)		(0.0219)
>3,175 g to 3,856 g												
>3,856 g to 4,536 g												
>4,536 g												
Observations	639	351	715	396	715	396	619	367	715	430	715	430

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) children's smoking behavior (whether currently smoking, smoking daily, quit smoking, and age first smoked); (b) indicator for raised blood pressure; (c) drinking behavior (whether currently drinking, drinking daily, quit drinking, and age first drank); (d) gender of the child; (e) gender of the household head; (f) household size; and (g) age of the child. The complete regression results can be found in Appendix B.

Table 5. Hazard Ratios with 95% Confidence Intervals for the Association of Individual Risk Factors with the Six Identified Illnesses of Mothers (Simple Regression)

Covariate	Heart disease				Tuberculosis				Diabetes			
	Hazard ratio	SE	95% Confidence interval		Hazard ratio	SE	95% Confidence interval		Hazard ratio	SE	95% Confidence interval	
Mother's BMI	0.970**	0.0137742	0.9433253	0.9973263	0.969347	0.0249409	0.9216758	1.019484	0.9697639	0.0240384	0.9237757	1.018
Categorical mother's BMI												
Underweight	1.205273	0.280767	0.7634819	1.902706	0.6908818	0.2361976	0.3535056	1.350241	1.165756	0.8424125	0.2828148	4.805
Overweight	0.9531722	0.1405901	0.7138741	1.272686	0.6748479	0.3160106	0.2695344	1.689653	0.726288	0.1543566	0.4788557	1.102
Obese class I	0.8112252	0.1736522	0.5332511	1.234102	0.602391	0.6204039	0.0800247	4.534537	0.8578324	0.2514217	0.4829745	1.524
Obese class II	0.576369	0.4115647	0.1421961	2.336219					1.163478	1.178247	0.1598641	8.468
Obese class III									1.163478	1.178247	0.1598641	8.468
Mother is obese	0.7890445	0.1565017	0.5348985	1.163943	0.2131994	0.2172749	0.0289277	1.571299	1.013372	0.2686001	0.6027722	1.704
No. of events	*244*				*46*				*112*			
Mother smokes	2.221***	0.5221633	1.401379	3.5214	1.335288	0.700173	0.4777913	3.731744	0.952034	0.2897393	0.5243246	1.729
Mother smokes daily	1.928***	0.4866714	1.175422	3.161934	0.3970908	0.41463	0.0512969	3.07389	0.6781474	0.2917292	0.2918432	1.576
Mother quit smoking	3.082**	1.436764	1.235933	7.685002	2.756422	1.886105	0.720948	10.53871	1.567772	0.8205908	0.5620229	4.373
Mother has raised blood pressure	1.182995	0.2210082	0.8202776	1.706103	0.707569	0.5360737	0.1602784	3.123651	0.9362609	0.221135	0.5893211	1.487
Mother drinks alcohol	1.075441	0.1982287	0.74936	1.543415	1.892481	1.225512	0.5318875	6.733534	0.8158174	0.2019749	0.5021782	1.325
No. of events	*129*				*22*				*83*			
Kinds of alcoholic beverage mother drinks												
Tuba	1.47656	0.6426222	0.6292086	3.465033					1.386371	1.472521	0.1728954	11.117
Gin	4.253*	3.30989	0.9250719	19.55046					0.5817253	0.3316372	0.1903068	1.778
Rum	1.680877	0.6885741	0.7530778	3.751735					6.188862	7.214763	0.6299546	60.801
Wine	0.3378998	0.2547556	0.0770965	1.480953					1.150178	0.883697	0.2551382	5.185
Others	2.669487	2.784922	0.3454764	20.62706					6.189**	5.149576	1.211575	31.613
No. of events	*46*								*25*			

Table 5 Hazard Ratios with 95% Confidence Intervals for the Association of Individual Risk Factors with the Six Identified Illnesses of Mothers (Simple Regression), continued

Covariate	Raised blood pressure				Hospitalization due to hypertension				CVD ailment			
	Hazard ratio	SE	95% Confidence interval		Hazard ratio	SE	95% Confidence interval		Hazard ratio	SE	95% Confidence interval	
Mother's BMI	1.004	0.008	0.988	1.021	0.974	0.070	0.847	1.120	0.991	0.021	0.952	1.033
Categorical mother's BMI												
Underweight	1.055	0.191	0.739	1.505					0.542	0.239	0.229	1.286
Overweight	1.055	0.086	0.899	1.237	1.161	0.890	0.259	5.215	1.000	0.220	0.650	1.539
Obese class I	1.080	0.124	0.863	1.353					0.636	0.206	0.337	1.200
Obese class II	1.052	0.298	0.604	1.834					23.634***	26.553	2.613	213.734
Obese class III	0.647	0.648	0.091	4.610	3.823	5.009	0.293	49.854				
Mother is obese	1.040	0.105	0.854	1.267					0.737	0.216	0.415	1.309
No. of events	*759*				*9*				*103*			
Mother smokes	1.008	0.091	0.845	1.203								
Mother smokes daily	0.945	0.095	0.776	1.149								
Mother quit smoking	1.455*	1.455	0.941	2.248								
Mother has raised blood pressure												
Mother drinks alcohol	1.014	0.075	0.877	1.173								
No. of events	*760*											
Kinds of alcoholic beverage mother drinks												
Tuba	1.206	0.207	0.860	1.689								
Gin	1.248	0.242	0.853	1.825								
Rum	1.134	0.209	0.790	1.628								
Wine	0.780	0.234	0.434	1.404								
Others	1.431	0.401	0.827	2.478								
No. of events	*299*											

Table 6. Hazard Ratios with 95% Confidence Intervals for the Association of Mother's BMI and Other Mother-Specific Risk Factors with Heart Disease, Raised Blood Pressure and CVD ailment (Multiple Regression)

Covariate	Heart disease				Raised blood pressure				CVD ailment			
	Hazard ratio	SE	95% Confidence interval		Hazard ratio	SE	95% Confidence interval		Hazard ratio	SE	95% Confidence interval	
Risk factors												
Mother's BMI	0.844**	0.0672597	0.722081	0.9868074	1.009347	0.0146275	0.9810815	1.038428	1.012642	0.0260902	0.9627759	1.065091
Mother has raised blood pressure	7.948***	6.199032	1.723484	36.65577								
Mother smokes	98.914***	143.751	5.730716	1707.28	1.12313	0.4232675	0.5365898	2.350809				
Mother smokes daily	0.014***	0.0225525	0.0006503	0.3145324	0.8159173	0.3232212	0.3753594	1.773556				
Mother quit smoking					1.21057	0.5852872	0.4693001	3.122694				
Mother drinks alcohol												
Mother quit drinking												
Kinds of alcoholic beverage mother drinks												
Tuba	2.073	1.334496	0.5870608	7.320759	1.172427	0.2118726	0.8227402	1.67074				
Gin	15.053*	24.1069	0.652324	347.3672	1.227846	0.2501255	0.8236543	1.830387				
Rum	2.238	1.464568	0.6208489	8.070015	1.144955	0.2221549	0.7827626	1.674736				
Wine	0.0001***	0.0002023	0.000000131	0.0313882	0.7522438	0.2541181	0.3879817	1.458499				
Others	3.202	4.275439	0.2338635	43.84654	1.460557	0.4323862	0.8175742	2.609215				
Number of events	46				299				102			

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) mother's age; (b) mother's highest educational attainment (no grade, high school, college, post-graduate); (c) household size; (d) household proportion variables; and (e) indicator for urbanity. The complete regression results can be found in Appendix C.

Table 6. Hazard Ratios with 95% Confidence Intervals for the Association of Mother's BMI and Other Mother-Specific Risk Factors with heart disease, raised blood pressure and CVD ailment (Multiple Regression), continued

Covariate	Heart disease				Raised blood pressure				CVD ailment			
	Hazard ratio	SE	95% Confidence interval		Hazard ratio	SE	95% Confidence interval		Hazard ratio	SE	95% Confidence interval	
Risk factors												
Categorical mother's BMI												
Underweight	70.598	193.596	0.327053	15239.54	1.05824	0.3149238	0.5905723	1.896247	0.359*	0.1969787	0.1225961	1.052258
Overweight	0.263*	0.1939456	0.062137	1.115481	1.172789	0.168208	0.8853922	1.553474	1.036142	0.2486372	0.6473833	1.658355
Obese class I	0.047***	0.0459247	0.0071206	0.3162564	1.100432	0.2053887	0.763294	1.58648	0.7724892	0.2751908	0.3842918	1.552829
Obese class II	0.808	1.236868	0.0402906	16.21867	1.150702	0.5597858	0.4434819	2.985724	56.058***	66.90842	5.403518	581.5628
Obese class III												
Mother has raised blood pressure	6.997**	5.894626	1.342241	36.4757								
Mother smokes	392.893***	657.1682	14.80883	10423.84	1.060923	0.4070672	0.5001323	2.250519				
Mother smokes daily	0.004***	0.0071492	0.0000993	0.1480832	0.8739267	0.3543094	0.3948016	1.934511				
Mother quit smoking					1.287489	0.62801	0.4949319	3.349205				
Mother drinks alcohol												
Mother quit drinking												
Kinds of alcoholic beverage mother drinks												
Tuba	2.436	1.604542	0.6698553	8.858282	1.165897	0.2107947	0.8180171	1.661719				
Gin	21.408**	32.11727	1.131292	405.1192	1.239384	0.2562209	0.8264847	1.858561				
Rum	5.39**	4.171298	1.182613	24.5658	1.12981	0.2208497	0.7702233	1.657273				
Wine	0***	0.0000731	3.12E-08	0.0153367	0.7682723	0.260224	0.3955505	1.492205				
Others	4.919	6.505874	0.3682408	65.71316	1.510181	0.4502537	0.8418737	2.709012				
Number of events	46				299				102			

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) mother's age; (b) mother's highest educational attainment (no grade, high school, college, post-graduate); (c) household size; (d) household proportion variables; and (e) indicator for urbanity. The complete regression results can be found in Appendix C.

Table 6. Hazard Ratios with 95% Confidence Intervals for the Association of Mother's Bmi and Other Mother-Specific Risk Factors with heart disease, raised blood pressure and cvd Ailment (Multiple Regression), continued

Covariate	Heart disease				Raised blood Pressure				CVD ailment			
	Hazard ratio	SE	95% Confidence interval		Hazard ratio	SE	95% Confidence interval		Hazard ratio	SE	95% Confidence interval	
Risk factors												
Mother is obese	0.23**	0.1602622	0.0587846	0.9010283	1.01796	0.1652539	0.7405394	1.399308	0.8783398	0.2939394	0.4558322	1.692467
Mother has raised blood pressure	4.694**	3.618666	1.035905	21.26913	1.107453	0.4172905	0.529165	2.317714				
Mother smokes	50.632***	69.39368	3.449935	743.0864	0.8183436	0.3246528	0.3760517	1.780836				
Mother smokes daily	0.043**	0.061938	0.0025562	0.7235267	1.229018	0.5936935	0.4768418	3.167688				
Mother quit smoking												
Mother drinks alcohol												
Mother quit drinking												
Kinds of alcoholic beverage mother drinks												
Tuba	2.537	1.55842	0.7612664	8.456397	1.173071	0.2120383	0.8231242	1.671795				
Gin	17.169*	27.00225	0.7871764	374.4876	1.245437	0.2551365	0.8335795	1.860785				
Rum	2.228	1.473525	0.609485	8.144625	1.160488	0.2242281	0.7946439	1.694762				
Wine	0***	0.000901	0.00000125	0.081259	0.760022	0.2565581	0.3921831	1.472867				
Others	4.735	6.076956	0.3826533	58.58595	1.471933	0.4375736	0.8219485	2.635917				
Number of events	*46*				*299*				*102*			

Notes: The following variables were included in the regressions but excluded in the presentation of tables for brevity: (a) mother's age; (b) mother's highest educational attainment (no grade, high school, college, post-graduate); (c) household size; (d) household proportion variables; and (e) indicator for urbanity. The complete regression results can be found in Appendix C.

Table 7. Hazard ratio child

	Per kilogram across all categories			
		P value	Confidence Interval	
Respiratory ailment				
Adjusted hazard ratio:				
for age	1.0000	0.7950	0.9999	1.0001
for age and BMI	1.0000	0.7990	0.9999	1.0002
Heart disease				
Adjusted hazard ratio:				
for age	1.0018	0.0440	1.0000	1.0035
for age and BMI	1.0024	0.0760	0.9997	1.0050
Cardiovascular ailment				
Adjusted hazard ratio:				
for age	1.0001	0.8390	0.9989	1.0013
for age and BMI	0.9999	0.8260	0.9986	1.0011
Diabetes				
Adjusted hazard ratio:				
for age	0.9995	0.8600	0.9939	1.0051
for age and BMI	0.9980	0.5650	0.9910	1.0049

Table 8. Run 3 Table 3

Hazard ratio (Interactions)

Respiratory ailments

	Adult BMI centile					
	< 20th	21st to 40th	41st to 60th	61st to 80th	>80th	Hazard ratio per unit BMI
Birth weight in kg (centile)						
<20th	1.72	1.75	1.85	1.83	1.56	0.5574
21st to 40th	1.71	1.50	1.70	1.66	1.55	0.6025
41st to 60th	1.26	1.25	1.36	1.29	1.25	0.7528
61st to 80th	1.55	1.50	1.61	1.45	1.27	0.6613
>80th	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
Hazard ratio per kg birth weight	0.6248	0.5971	0.5771	0.5904	0.6913	

Cardiovascular ailments

	Adult BMI centile					
	< 20th	21st to 40th	41st to 60th	61st to 80th	> 80th	Hazard ratio per unit BMI
Birth weight in kg (centile)						
<20th	0.61	(empty)	0.56	(empty)	6.25	1.0521
21st to 40th	0.16	(omitted)	(omitted)	(omitted)	(omitted)	1.0521
41st to 60th	(empty)	(empty)	(omitted)	(empty)	(empty)	2.0424
61st to 80th	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
>80th	(omitted)	(empty)	(empty)	(omitted)	(empty)	(omitted)
Hazard ratio per kg birth weight	9.7319	3.8789	4.3189	1.6240	1.1643	

Diabetes

	Adult BMI centile					
	< 20th	21st to 40th	41st to 60th	61st to 80th	> 80th	Hazard ratio per unit BMI
Birth weight in kg (centile)						
<20th		(omitted)		(omitted)	(omitted)	0.4822
21st to 40th		(empty)		(empty)	(omitted)	(omitted)
41st to 60th						(omitted)
61st to 80th						(omitted)

> 80th						(omitted)
Hazard ratio per kg birth weight	(omitted)	0.3066	(omitted)	0.3066	(omitted)	

Raised blood pressure

	Adult BMI centile					
	< 20th	21st to 40th	41st to 60th	61st to 80th	> 80th	Hazard ratio per unit BMI
Birth weight in kg (centile)						
<20th	0.9875	1.2994	1.3321	1.8286	1.1836	0.7421
21st to 40th	1.6249	2.1971	2.1057	2.4680	1.4151	0.5178
41st to 60th	1.8393	1.9808	2.3173	2.2325	1.6680	0.5280
61st to 80th	1.2436	1.1562	1.1345	1.4800	0.7551	1.0066
>80th	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
Hazard ratio per kg birth weight	0.5867	0.5230	0.4956	0.4679	0.6120	