Overweight children and women in India: Evidence from three waves of the National Family Health Survey, 1992-2006.

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Excess weight gain and potential obesity among children in the developing world is an increasing concern as the world becomes more developed and urban. Changing urban life styles bring an increasing availability of fast and processed foods. Compounding this is the growth of working middle-class and poor families, often with exceedingly long commutes, that adopt western-style work-family dynamics impacting traditional means of food consumption and preparation (Popkin 1994). Urban women and higher socioeconomic groups have been shown to consume increasing proportions of fats and high calorie foods (Shetty 2000; IIPS 2000). Increasing prevalences of weight gain and obesity among women of higher socioeconomic status and urban women have also been documented (Griffiths and Bentley 2001, 2005). Urbanization and economic development can potentially lead to a public health paradox of concurrent under- and over-nutrition in the developing world population. Furthermore, while malnutrition among children remains a substantial concern, and public health priority, the implications of a simultaneous obesity disparity is not to be ignored. This study examines these trends in India, from 1992/93-2005/06, a period in which India has seen a rapid rate of urbanization and economic development (World Bank).

Looking elsewhere in the developing world, results from the 2008 Ghana Demographic and Health Survey (DHS) show that the proportion of overweight children has risen from 1% in 1998 to 5% in 2008. This nutritional transition has also been observed in Latin America and the Caribbean, the Middle East and North Africa (Martorell et al., 2000). In the 1992/93 and 1989/99 National Family and Health Survey (NFHS) Reports, while malnutrition and underweight indicators are discussed, there is no mention of the potential for children being overweight. It is first discussed in the third wave of the survey, in 2005-06. Using data from 1992/93 in a comparative study, Martorell and colleagues (2000) found that 3.5% of Indian children between the ages of 1-5 years were overweight and 1.1% were obese. The 2005/06 NFHS Report found that 2.5% of urban children and 1.2% or rural children under 5 years were overweight. (These two reports are not comparable as the former omits children under age one and the latter estimate includes them.) This study will explore the potential trends, and determinants, in childhood overweight and obesity in India by combining these three survey waves from NFHS.

Studies have suggested that the onset of child obesity lags behind that of adult obesity (Popkin et al., 2006). Because we expect that childhood rates of overweight or obesity in India, even in 2005/06 data, will be quite low, we will also evaluate the trend and determinants of mothers' nutritional status. Fortunately, the NFHS collects information on women's Body Mass Index (BMI), from which standardized measures of overweight and obesity analogous to standardized measures of child height-for-weight. Therefore, in this analysis in addition to examining childhood overweight and obesity rates, and their determinants, we will also examine obesity trends, and determinants, among teen and adult women (i.e., women ages 15-49). Preliminary analysis suggests that in contrast to small percentages found among children, there are already high proportions—more than one-quarter—of overweight female adults (an increasing fraction of which are overweight) in India.

Data and Preliminary Analysis

Our preliminary analysis is to examine whether there has been an increase in childhood overweight and obesity among Indian children. Figure 1 shows the urban/rural and sex differences in weight for height for Indian children ages 0-35 months across three waves of the NFHS between1992-2006. All three waves collected anthropometric data on children up to at least 35 months of age. (The 1992/93 and 2005/06 waves contain information for children up to age 5, so some comparisons may be restricted to that subset in order to glean information for children ages 4-5, ages that are typically beyond breastfeeding ages in India and where fuller effects of overweight may be observable.) The variables of interest in our sample were child's age, sex, weight, height and residence (urban or rural). Only records with complete data for all variables were used. A total of 99,846 children were included in the analysis with the following breakdown by wave: 28,898 in NFHS-I; 27,211 in NFHS-II; and 43,739 in NFHS-III.

Preliminary analysis confirms prior expectations of differences in the growth curves between urban and rural children as well as boys and girls with both rural populations and girls having lower proportions of weight for height (see Fig 1a and Fig 1b). While the differences are not enormous, Figure 1b shows that weight for height for both boys and girls is shifting upward, especially in the 75th and 90th percentile in the 30-35 month age group. Figure 2, which shows at the proportions of adult and teen women (ages 15-49) who are overweight or obese, depicts a clearer picture: Nearly a quarter of urban Indian women and more than 5 percent of the rural women are either overweight or obese. Between 1998/99-2005/06, while the proportion of women does not increase in this general category that includes both overweight and obese classifications, Figure 2 shows small increases in the percentage of urban and rural women who are classified as obese. In contrast to very small fractions of overweight found in children, the fractions in adult women suggest that India already has substantially high rates to be concerned about. These findings, particularly the presence of rural overweight, requires greater scrutiny on the urban and rural classification, as well as on behaviors influencing rural lifestyles, in rapidly developing India.

Additional confounding factors play an important role in the lack of clear visible trends across the three waves for either urban or rural populations. We also expect that

changes in the fractions of children under 3 who are overweight to still be quite small in India even in 2005/06. Thus, the analysis plan needs to account for differences that may be statistically significant albeit small in magnitude.

Analysis Plan

This analysis will describe trends in overweight and obesity among Indian children (under age 5, or subsets thereof) and women ages 15-49, in three repeated cross-sections.[1] The analysis of children will use multivariate regression estimation and control for child's age, mother's education, household wealth-proxies, child's gender and birth-order, urban or rural residence (including city, town, countryside), and mothers' BMI (for a subset of the sample, as the sample includes all children in household regardless of whether or not their mother was interviewed), among other variables. The exact specification of the regression has yet to be determined but will take into account factors that may influence the child at the individual, household and ecological levels. Indicators for obesity, overweight, and at risk of overweight will be constructed following the new WHO Child Growth Standards for 0-5 year-olds (WHO, 2006). We will estimate the risk of obesity and overweight from data pooling all NHSF cross-sections. The analysis will test for survey/period effects and investigate which of the covariates contribute to the trends. A similar strategy will be followed with respect to understanding which teen and adult women are more likely to be obese, and whether the covariates are consistent predictors over the three survey rounds. To the extent possible, we aim to determine whether there is evidence of a lag in overweight and obesity between women and children.

Some special attention will need be paid to data quality. First, in our preliminary Figure 1, we use the recoded age-at-month variable, but we will re-estimate with age-at-birth and age-at-survey, per recommendations of the DHS. Second, the 1998/99 NFHS has been documented to have missing data concerns regarding child anthropometric variables (Pullum 2008). Third, identifying a fuller range of urban living (big city, town, countryside) is desirable, but these classifications have been scrutinized unfavorably in some countries.

While preliminary estimates from the NFHS Report for 2005/06 find that rate of overweight in children and overweight and obesity rates in women increases substantially with wealth, there is growing attention in the literature that the burden of overweight children is shifting from the wealthy to the poor even in developing countries (Jones-Smith et al., 2012). Thus this analysis will aim to carefully identify potential groups at risk. Furthermore, by understanding who is at risk of being overweight in India, we can contrast these findings to well-known factors affecting the underweight population, we can better understand potential inequalities in nutrition. (If time allows, we could make the comparison directly in the analysis.)

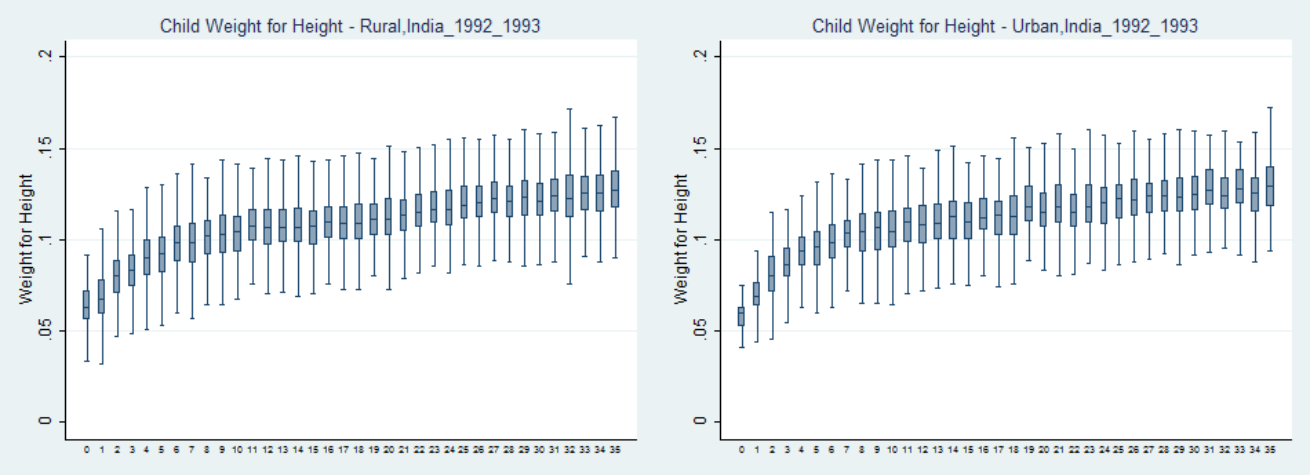
(Unlike many of the recent Demographic and Health Surveys which have been geocoded, the Indian NFHS does not include survey-cluster geocodes. For an analysis

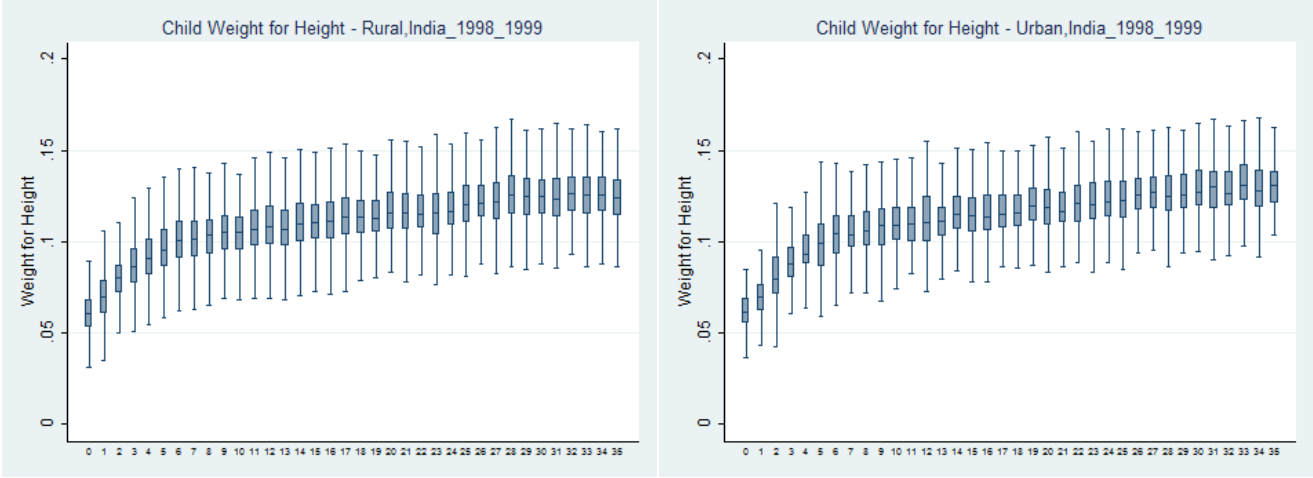
[1] Even if there no trends are clearly identified, we will plan to examine the determinants of overweight children and women.

like this, where prior research suggests that location-specific characteristics of food availability and quality – or even distance to food markets – could potentially be important to evaluate, geocoded survey clusters would be ideal. The NFHS includes a primarily sampling unit identifier that is based on the sampling frame of the national statistical office. If time allows, we will determine whether anything can be done to better locate individuals so that some analysis can be done in a spatial framework: examine spatial patterns, correlates, and determinants.)

This analysis is intended to be primarily descriptive and theory-building. Once we gain a better understanding of the potential confounding factors, we will summarize groups at differential risk, thus aiming to distill what the potential implications are for the trends in childhood overweight and obesity in India in the near future.

Figure 1a: Trends in the distribution of weight for height by age (in months) over three waves of NFHS in India, by place of residence (1992-2006)





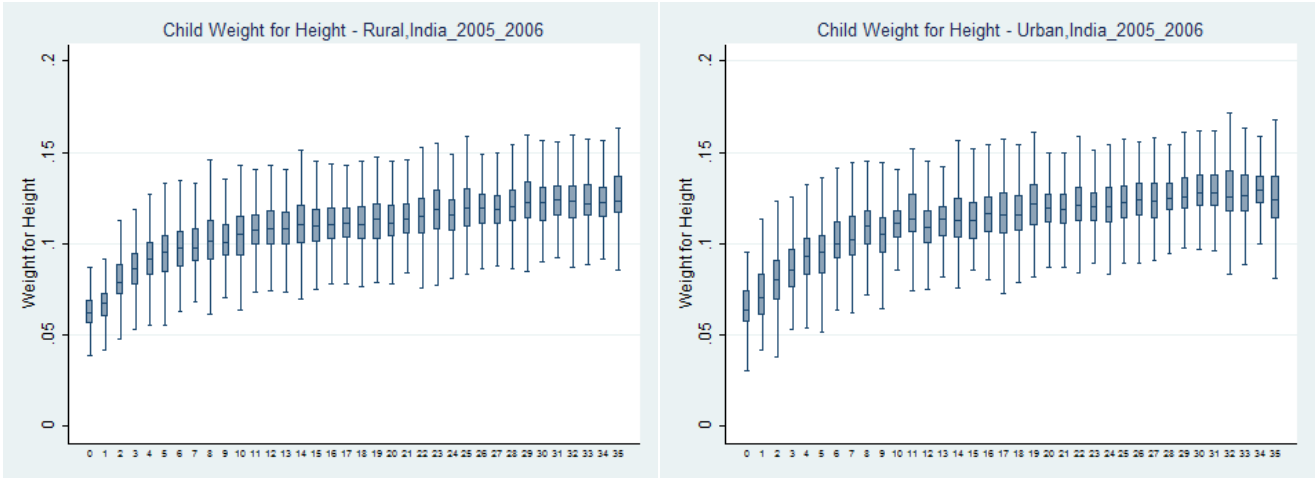


Figure 1b: Trends in the distribution of weight for height by age (in months) over three waves of NFHS in India, by sex (1992-2006)

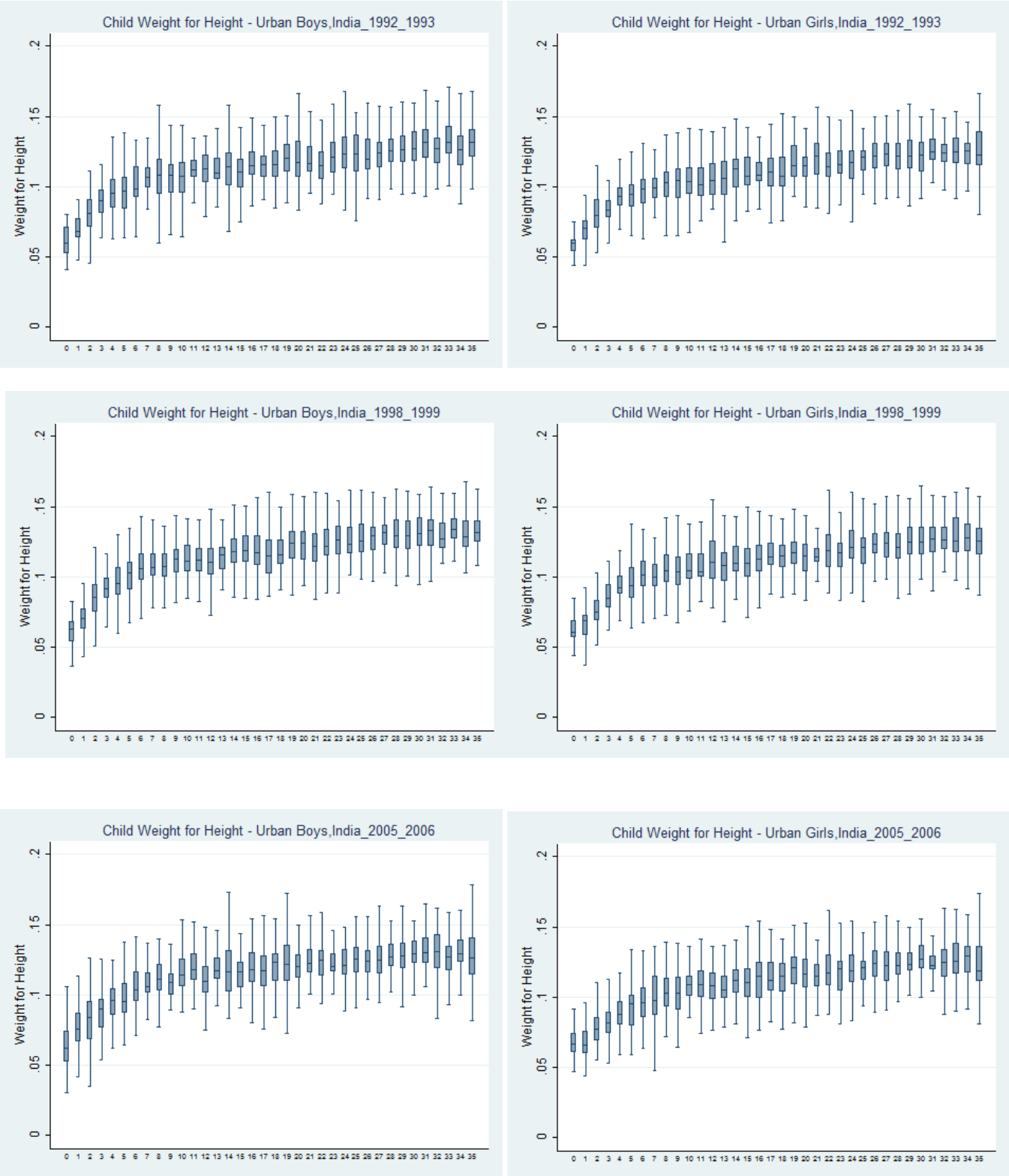
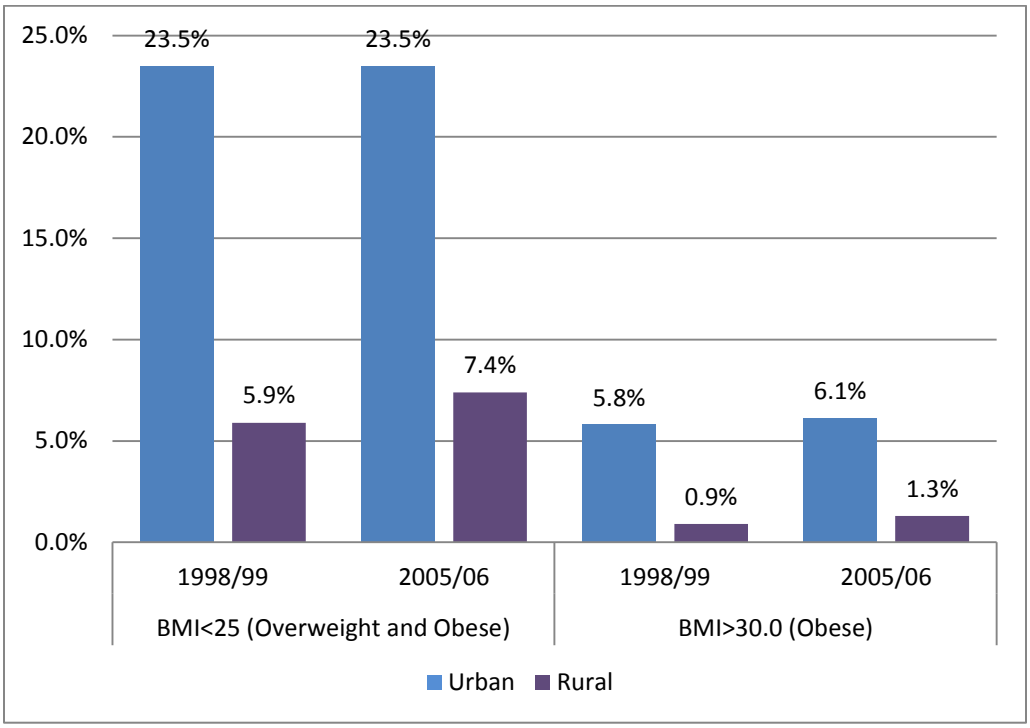


Figure 2: Percentage of overweight and obese Indian Women (15-49 years) by place of residence over two waves of NFHS (1998-2006)



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