ORIGINAL ARTICLE

Childhood socioeconomic position, adult socioeconomic position and social mobility in relation to markers of adiposity in early adulthood: evidence of differential effects by gender in the 1978/79 Ribeirao Preto cohort study

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BACKGROUND: Longitudinal studies drawn from high-income countries demonstrate long-term associations of early childhood socioeconomic deprivation with increased adiposity in adulthood. However, there are very few data from resource-poor countries where there are reasons to anticipate different gradients. Accordingly, we sought to characterise the nature of the socioeconomic status (SES)-adiposity association in Brazil.

METHODS: We use data from the Ribeirao Preto Cohort Study in Brazil in which 9067 newborns were recruited via their mothers in 1978/79 and one-in-three followed up in 2002/04 (23–25 years). SES, based on family income (salaries, interest on savings, pensions and so on), was assessed at birth and early adulthood, and three different adiposity measures (body mass index (BMI), waist circumference (WC), waist-to-hip ratio (WHR)) ascertained at follow-up. The association between childhood SES, adult SES and social mobility (defined as four permutations of SES in childhood and adulthood: low–low, low–high, high–low, high–high), and the adiposity measures was examined using linear regression.

RESULTS: There was evidence that the association between SES and the three markers of adiposity was modified by gender in both adulthood (P < 0.02 for all outcomes) and childhood SES (P < 0.02 for WC and WHR). Thus, in an unadjusted model, linear regression analyses showed that higher childhood SES was associated with lower adiposity in women (coefficient (95% confidence intervals) BMI: −1.49 (−2.29, −0.69); WC: −3.85 (−5.73, −1.97); WHR: −0.03 (−0.04, −0.02)). However, in men, higher childhood SES was related to higher adiposity (BMI: 1.03 (0.28, −1.78); WC: 3.15 (1.20, 5.09); WHR: 0.009 (−0.001, 0.019)) although statistical significance was not seen in all analyses. There was a suggestion that adult SES (but not adult health behaviours or birthweight) accounted for these relationships in women only. Upward mobility was associated with protection against greater adiposity in women but not men.

CONCLUSION: In the present study, in men there was some evidence that both higher childhood and adulthood SES was related to a higher adiposity risk, while the reverse gradient was apparent in women.

INTRODUCTION

Globally, an estimated one in ten individuals are now obese. Between 1980 and 2008, the age-standardized prevalence of obesity rose from 4.8 to 9.8% in men, and from 7.9 to 13.8% in women worldwide. As has been well documented, overweight and obesity have been linked to several major chronic diseases, including type 2 diabetes, selected cancers, cardiovascular disease, asthma, gallbladder disease, osteoarthritis and chronic back pain. An estimated 2.6 million people die each year from non-communicable disease as a result of being overweight or obese, the large majority of deaths occurring in resource-poor countries. Several risk factors for overweight and obesity (environmental, genetic, physiologic, metabolic and behavioural) have been identified during different periods of the life course, with special attention given to those occurring early in life. A review of the effects of early-life socioeconomic status (SES) based on 30 studies, almost all from high-income countries, found that low childhood SES was typically associated with an elevated risk of adult obesity, particularly in women.

There have been conflicting reports as to the direction of the SES–adiposity relation in low- and middle-income countries (LMICs): some investigators report that higher SES is associated with higher adiposity, and others that higher SES is associated with lower adiposity. This may be due to methodological limitations including the SES indicator used. In addition, most populations comprise only women, yet there may be differential SES–adiposity effects according to gender as evident in a cohort from China. However, longitudinal data from LMICs are scarce. This is in part because of the high loss to follow-up resulting from

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To examine the effect of social mobility on adiposity, a variable comprising the four different permutations of childhood and adult SES categories was created: (low–low = 1, low–high = 2, high–low = 3, high–high = 4); ‘low–low’ was the reference group.

The role of a number of adult health behaviours as key mediators was also investigated: total caloric intake, percent fat intake and physical activity. Non-smokers (non-smokers of cigarette, wine and/or tobacco) were classified as low, moderate and high based on the metabolic cost or unit of resting metabolic rate (MET). Study members had been weighed at birth within 30 min of delivery, naked, using mechanical scales that were calibrated weekly and with a measurement accuracy of 10 g (Filizola, Brazil).

Statistical analysis

The sample characteristics were examined by SES and by gender. Linear regression was used to estimate the coefficients and 95% confidence intervals (CI) for the association between childhood SES and the three markers of adiposity. In model 1, the unadjusted SES-adiposity relationship was estimated. In model 2, adult SES was added. Model 3 builds on model 2 by adding the potentially mediating health behaviour variables (total caloric intake, percentage dietary fat, alcohol consumption and smoking), as well as birthweight (a confounder). A path diagram of the association between childhood SES and adult adiposity based on known associations in developed countries is shown in Figure 2. The regression results were examined in the light of the expected associations depicted in this diagram.

In preliminary analyses, it became apparent that gender was an effect modifier (interacting variable) in the SES-adiposity relationship. The P-values for a gender interaction for childhood and adulthood SES in relation to WC and WHR were < 0.02 in all models. For BMI, the equivalent P-value was < 0.001 in the crude model. On this basis, analyses were performed separately for men and women. All the analyses were conducted using the STATA 10 statistical package (College Station, TX, USA).

RESULTS

Table 1 shows the distribution of cohort characteristics by childhood and adult SES. Higher SES in childhood and adulthood was associated with higher birthweight for men and women. Birthweight was normally distributed in all income groups. Higher SES in both men and women was associated with lower current caloric intake, while higher SES was associated with a higher frequency of alcohol consumption and smoking.

Table 2 shows the unadjusted and adjusted linear regression coefficients for the association between SES and adiposity as measured by BMI. As described, there was some evidence of a difference in these associations in men and women. Thus, higher childhood SES was associated with lower adult BMI in women (regression coefficient for high vs low childhood SES; 95% CI: 1.49; 2.29, −0.69), whereas men from a more affluent background had an elevated adult BMI relative to their lower SES markedly change the association between childhood SES and BMI in either women or men. Further adjustment for health behaviours and birthweight did not markedly change the association between childhood SES and BMI in either women or men.

Table 3 shows the results of the analyses with WC and WHR as the outcomes of interest. The pattern of association with SES was similar to that for BMI, except that the association between childhood SES and WHR remained significant after adjustment for the covariates. A model adjusting the childhood SES estimates for health behaviours and birthweight (omitting adult SES) was run, but did not result in any important differences. For example, the coefficient comparing high with low childhood SES in relation to BMI; 95% CI was −1.49; −2.29, −0.69 before adjustment and
1.50; – 2.33, 0.67 after adjustment (full results available on request). Controlling for each individual health behaviour separately did not have any further impact on the SES–adiposity estimates (full results also available on request).

Table 4 shows the relationship of social mobility with the three markers of adiposity. Among men, there was some suggestion that upward mobility might be associated with protection against increased adiposity (unadjusted coefficient for association

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**Figure 1.** Sample characteristics of the RPCS at birth and at follow-up at 23/25 years.

**Figure 2.** Path diagram of the association between childhood SES and adult adiposity.

*N.B. The relationships are based on known associations in high income countries*
between upward mobility (low–high) vs no mobility (low–low) for BMI; 95%CI: –0.48; –1.35, 0.39). Both downward mobility (high–low) and remaining in the high SES group (high–high) appeared to be associated with higher adiposity compared with remaining in the low SES group (low–low) in men. Among women, the coefficients showed that upward mobility (low–high) was protective against adult adiposity compared with remaining in the low SES (low–low) group (unadjusted coefficient: –2.30; –4.44, –0.15 for WC). Remaining in the high SES group (high–high) was also protective compared with remaining in the low SES group (low–low) (adjusted coefficient: –5.55; –7.56, –3.53 for WC).

**DISCUSSION**

In the present study, we examine the relation of SES in childhood and early adulthood with adult adiposity in a country in economic transition by using data from the Ribeirão Preto Cohort. The main finding was that in women higher (adulthood) SES is associated with lower adiposity, whereas in men higher (childhood) SES is associated with higher adiposity. Upward mobility and retaining a high SES were found to be protective against adult adiposity in women with the results generally consistent across the adiposity measures.

Comparison with prior studies

In relation to the conflicting reports as to whether excess adiposity is becoming a problem of the poor or remains a problem of the higher social groups, this study contributes by using a different measure of SES (income). Most other studies are based on data for women, and use education or wealth to represent SES. The findings presented in this study show that excess adiposity is a greater problem for low rather than high SES women, as found in high-income countries (HICs). The findings concur with the predictions from the Monteiro model (2004) that in countries with a gross national income per capita greater than US$ 2500 (in 2005) higher SES is associated with lower adiposity in women (Brazil's gross national income per capita in 2005—near the time of follow-up—was US$ 3960).

The opposite is true for men (higher SES is associated with higher adiposity). Where data for men are available, evidence suggests that higher SES men become protected from excess adiposity much later than higher SES women in the process of economic development, which could explain the gender differences observed in this study. Among men in the UK Whitehall II cohort, a negative association between SES and WHR appears to have emerged, suggesting men of higher SES may eventually become protected compared with men of lower SES at very high levels of gross national income per capita.

In terms of the relative importance of childhood vs adult SES, the findings in this study differ from those in HICs, where childhood SES appears to be important in determining adult adiposity in women and less so in men. There are however comparable gender differences in the childhood SES–adiposity relationship in HICs: higher childhood SES is associated with lower adiposity in women (as in this study), while a less consistent direction of association is reported in men (we report a positive association). Data from China—another LMIC—show an independent association between early-adulthood SES and metabolic risk after adjustment for childhood SES and metabolic risk in women as reported in this study.

We also found that upward mobility reduces the risk of excess adiposity in women, as reported in some of the cohorts from HICs, but not others such as the Whitehall II cohort and the British Birth Cohort. This may be a result of differences in cohort maturity. The much more mature UK cohorts may be subject to an attenuation of the protective effect of upward mobility due to the increased risk of overweight associated with ageing. In addition, mobility effects may be much more pronounced in rapidly changing economies.
Socioeconomic status, gender and adiposity in Brazil
A Aitsi-Selmi et al

Plausible mechanisms

Socially patterned childhood exposures are thought to influence later life outcomes in a number of ways including biological programming during critical periods of growth, and through the early acquisition of unhealthy lifestyles.24 While childhood and adult SES are correlated, the importance of adult SES in this study was greater in the SES–adiposity relationship in women, whereas childhood SES appears to be more important in men. One explanation for this gender differential may lie in the rapidly changing environment, in the early 1980s when the RPCS cohort participants were children, overweight and obesity were not yet a public health problem, and awareness of dietary habits and obesity may have been low. At that time, ensuring children had a sufficient quantity of food and enjoying any new commercial food products were the dietary priority. At follow-up, however, in 2004, it is likely that women of high SES would have experienced social pressure to lose weight and conform to a slim, western body shape preference.25 Men on the other hand, may not have experienced the pressure of these new norms, and may simply have retained the dietary habits and body shape expectations formed in their childhood.

This explanation is temporally consistent with observed long-term trends of obesity by SES in Brazil. From 1975 to 1997, a period of significant social and economic change in Brazil, obesity increased from 2.4 to 6.9% among men and from 7 to 12.5% among women. This change, however, was not observed across all socioeconomic groups. In men, all groups showed an increase in obesity over time, and the gradient remained positive (men in the higher SES group (higher income) had a higher prevalence of obesity). In women, obesity more than doubled in the lower SES group, while the prevalence in richer women started to drop from 12.8% in 1989 to 9.2% in 1997.7,26 This suggests the social gradient had reversed in Brazil in women but not men, and is consistent with other reports.11

In further explaining why women who remain in the low SES group (low–low—see Table 4) are most at risk of increased adiposity (whereas men in the same social mobility category are not), a biology-environment interaction specific to transition settings may be at play. A rapid nutrition transition from a situation of calorie scarcity to one of high-energy density could have caused a mismatch between metabolic programming and the energy available for consumption, with a consequent increase in the susceptibility to excess adiposity, as formulated in Gluckman’s match–mismatch hypothesis.27 Indeed, stunted Brazilian children have been found to have impaired oxidative stress, which combined with a later life exposure to energy-dense diets, increases the risk of obesity.28 This phenomenon is thought to only be observable in countries undergoing a rapid nutrition and economic transition.29

Furthermore, intra-uterine growth retardation was socially patterned in the RPCS with lower birthweights found among lower SES groups.30 A separate study of the RPCS found that severe intrauterine growth restriction (IUGR) was associated with increased preference for carbohydrate consumption in girls but not boys.31 A study of a Chinese cohort has also examined the effect of rapid transition in both genders (using a natural experiment). It compared long-term Hong Kong residents with residents who had migrated from a relatively undeveloped Chinese province, and found gender differences in lipid profile and fat distribution.31,32 It was postulated that sex hormones in puberty among males experiencing an improved nutrition environment and higher socioeconomic development caused them to be more likely to be at risk.

Other possible explanations for the gender and SES differentials that link social and biological factors, include the large scale social changes experienced in Brazil particularly by women. There has been a dramatic decline in fertility rates, especially in wealthier households,33,34 where women of higher SES tend to have fewer children35 (through older age at marriage and contraceptive use).36 This may reduce their risk of excess adiposity compared with lower SES women who continue to have a relatively greater number of children. In addition, the adiposity risk associated with repeated pregnancies (correlated with limited access to contraceptive technologies and education) may explain why women appear to be generally more susceptible to excess adiposity than men in LMICs.27 These initial findings from LMICs

| Table 2. Unadjusted and adjusted linear regression coefficients for the association between SES and BMI by gender—Ribeirão Preto Cohort Study, 1978/79 and 2004/06 |
|---|---|---|---|---|---|---|---|---|---|---|
| | n | Mean (SD) | Unadjusted Coefficient (95% CI) (model 1) | P for trend | Adjusted coefficient (95% CI) (model 2) | P for trend | Adjusted coefficient (95% CI) (model 3) | P for trend |
| **BMI (kg m⁻²)** |
| **Women** |
| Childhood SES | | | | | | | | | |
| Low (1.6–2.4) | 314 | 24.2 (5.3) | Referent | <0.001 | Referent | 0.314 | 0.211 |
| Medium (3.2–4.4) | 273 | 23.7 (4.9) | -0.52 (-1.32; 0.27) | | -0.20 (-1.05; 0.64) | | -0.29 (-1.15; 0.56) |
| High (6.4–12.8) | 267 | 22.7 (4.4) | -1.49 (-2.29; -0.69) | | -0.64 (-1.38; 0.50) | | -0.36 (-1.51; 0.39) |
| P for gender interaction | <0.001 | 0.074 | 0.076 |
| **Adult SES** | | | | | | | | | |
| Low (2.1–4.4) | 376 | 24.4 (5.8) | Referent | <0.001 | Referent | 0.004 | | 0.003 |
| Medium (4.7–13.7) | 343 | 23.8 (4.7) | -0.61 (-1.35; 0.13) | | -0.47 (-1.30; 0.36) | | -0.49 (-1.32; 0.35) |
| High (13.9–20) | 256 | 22.3 (4.2) | -2.02 (-2.83; -1.22) | | -2.15 (-3.11; -1.19) | | -2.32 (-3.31; -1.33) |
| P for gender interaction | <0.001 | 0.004 | 0.003 |
| **Men** | | | | | | | | | |
| Childhood SES | | | | | | | | | |
| Low (1.6–2.4) | 268 | 24.5 (4.1) | Referent | 0.007 | Referent | 0.105 | 0.31 |
| Medium (3.2–4.4) | 291 | 25.0 (4.4) | 0.45 (0.29; 1.19) | | 0.54 (0.24; 1.32) | | 0.51 (0.27; 1.29) |
| High (6.4–12.8) | 273 | 25.5 (4.8) | 1.03 (0.28; 1.78) | | 1.03 (0.18; 1.88) | | 0.92 (0.06; 1.78) |
| P for gender interaction | <0.001 | 0.074 | 0.076 |
| **Adult SES** | | | | | | | | | |
| Low (2.1–4.4) | 301 | 25.0 (4.7) | Referent | 0.679 | Referent | 0.501 | 0.43 |
| Medium (4.7–13.7) | 286 | 24.9 (4.5) | -0.11 (-0.84; 0.62) | | -0.48 (-1.29; 0.33) | | -0.51 (-1.32; 0.29) |
| High (13.9–20) | 344 | 25.1 (4.3) | 0.14 (-0.56; 0.83) | | 0.29 (-1.11; 0.53) | | 0.34 (-1.17; 0.49) |
| P for gender interaction | <0.001 | 0.004 | 0.003 |

Abbreviations: BMI, body mass index; SES, socioeconomic status. *Unadjusted model (Model 1 (childhood SES or adult SES)). **Mutually adjusted model (Model 2 = Model 1 for Childhood SES + model 1 for adult SES). ***Fully adjusted model (Model 3 = Model 2 + health behaviours + birthweight). Health behaviours include total calorie intake, percent fat in diet, alcohol consumption, smoking and physical activity.
Table 3. Unadjusted and adjusted linear regression coefficients for the association between SES and WC and WHR by gender—Ribeirão Preto Cohort Study, 1978/79 and 2004/06

| WC (cm) | n | Mean (s.d.) | Unadjusted coefficient (95% CI) (Model 1) | P for trend | Adjusted coefficient (95% CI) (Model 2) | P for | Adjusted coefficient (95% CI) (Model 3) | P for | Unadjusted coefficient (95% CI) (Model 1) | P for | Adjusted coefficient (95% CI) (Model 2) | P for | Adjusted coefficient (95% CI) (Model 3) | P for |
|--------|---|-------------|------------------------------------------|------------|-----------------------------------------|------|-----------------------------------------|------|------------------------------------------|------|-----------------------------------------|------|-----------------------------------------|------|
|        | Women | Childhood SES |                                           |            |                                         |      |                                         |      |                                         |      |                                         |      |                                         |      |            |
|        | Low (1.6-2.4) | 315 | 78.3 (12.1) | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | Referent | 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including Brazil and China begin to illustrate how risk factors that have both critical and cumulative effects differ in salience in men and women, and how rapid economic transition can influence this salience.38

Strengths and limitations

The 1978/79 RPCS provides unique data for the investigation of cardiovascular risk in transition settings. The findings are hypothesis generating for future research in LMICs despite any limitations. Of the samples (comprising 36% of the original cohort), those followed up had a slightly higher overall education level, and occupational status compared with the overall sample.12 In addition, individuals of low SES had somewhat lower follow-up rates compared with those of high SES: 30% of women and 25% of men of low SES were followed up compared with 36% of women and men of high SES (P < 0.05 for the difference between SES groups). This may have influenced the variation in the sample and account for the absence of social patterning of some of the important behavioural factors in Table 1. In particular, the fact that there was a significant difference between the two periods in the prevalence of low childhood SES may have affected the results. However, the fact that the findings are consistent with other cohorts from Brazil and data from Chinese cohorts supports their relevance in understanding the social patterning and mechanisms of excess adiposity in LMICs.

A single SES measure was used in the study, but the availability of income data provides an alternative to the wealth and education indicators commonly used in analyses of SES and adiposity, and contribute to resolving some of the questions surrounding the association in LMICs. Education was not taken into account although it has been shown to mediate between childhood SES and adult smoking and overweight.18 This may have had a role in producing the gender differences observed in the data as the health returns to educational attainment are likely to differ between the populations of men and women in Brazil. However, the majority of participants at follow-up had similar levels of education (over 12 years of schooling).13

The results were largely consistent across the three adiposity measures, displaying the same gender patterns. The availability of anthropometry at birth strengthens the conclusions regarding SES effects independently of biological factors. The investigation incorporated health behaviours and revealed very little role for these in mediating the SES effect in either gender. Although physical activity remains difficult to assess accurately, the International Physical Activity Questionnaire is one of the more reliable questionnaires. The cohort was not old enough to yield information about effects at older ages and therefore limits the generalisability of the findings to other age groups.

Finally, another possible source of uncertainty around the results comes from the fact that low SES participants were more often found to be heads of their household (53%) compared with high SES participants (16%), which may have affected the precision of the household-based SES measurement. The most likely explanation is that high SES 24-year-olds will have remained in education for longer and be living in their parental homes. Low SES individuals would more often be classified as head of the household either because they entered employment and started earning greater incomes than their parents, or may have started working, got married and left the parental home. In view of these contextual observations, it is unlikely that the precision of the SES measure would be significantly affected particularly in comparing low- and high-SES groups, because the overall aggregate household incomes would have been very different.

| Table 4. Unadjusted and adjusted linear regression coefficients for the association between social mobility and adult adiposity in women and men—Ribeirão Preto Cohort Study, 1978/79 and 2004/06 |
|---|---|---|---|---|---|---|---|
| Variables | Childhood SES | Adult SES | Social mobility | n | Mean (SD) | Unadjusted coefficient (95% CI) | Unadjusted P-value | Adjusted coefficient1 (95% CI) | Adjusted P-value |
| **Women** | | | | | | | | | |
| BMI | Low | Low | 215 | 24.6 (5.8) | Referent | 0.001 | Referent | <0.001 |
| | Low | High | 213 | 23.7 (4.8) | −0.03 (−1.86 to −0.01) | −0.05 (−1.89 to −0.01) |
| | High | Low | 76 | 23.9 (5.0) | −0.15 (−2.03 to 0.53) | −0.26 (−2.05 to 0.53) |
| | High | High | 278 | 22.6 (4.1) | −2.04 (−2.91 to −1.17) | −2.20 (−3.12 to −1.29) |
| WC | Low | Low | 217 | 79.4 (13.1) | Referent | <0.001 | Referent | <0.001 |
| | Low | High | 213 | 77.1 (11.4) | −2.3 (−4.44 to −0.15) | −2.24 (−4.42 to −0.06) |
| | High | Low | 76 | 77.7 (11.6) | −1.68 (−4.64 to 1.29) | −1.59 (−4.59 to 1.40) |
| | High | High | 278 | 73.9 (9.7) | −5.55 (−7.56 to −3.53) | −5.56 (−7.68 to −3.44) |
| WHR | Low | Low | 217 | 0.78 (0.06) | Referent | <0.001 | Referent | <0.001 |
| | Low | High | 213 | 0.76 (0.06) | −0.014 (−0.026 to −0.003) | −0.013 (−0.024 to −0.001) |
| | High | Low | 76 | 0.77 (0.06) | −0.01 (−0.025 to 0.006) | −0.009 (−0.025 to 0.006) |
| | High | High | 278 | 0.74 (0.06) | −0.405 (−0.051 to −0.030) | −0.037 (−0.048 to −0.026) |
| **Men** | | | | | | | | | |
| BMI | Low | Low | 184 | 24.8 (4.6) | Referent | 0.03 | Referent | 0.09 |
| | Low | High | 224 | 24.4 (3.8) | −0.15 (−1.35 to 0.39) | −0.53 (1.14 to 0.35) |
| | High | Low | 63 | 25.7 (4.9) | 0.086 (−0.42 to 2.14) | 0.66 (−0.64 to 1.96) |
| | High | High | 313 | 25.4 (4.7) | 0.56 (−0.25 to 1.38) | 0.39 (−0.44 to 1.23) |
| WC | Low | Low | 184 | 86.8 (12.0) | Referent | 0.007 | Referent | 0.051 |
| | Low | High | 225 | 85.9 (9.8) | −0.95 (−3.22 to 1.32) | −1.15 (−3.42 to 1.12) |
| | High | Low | 63 | 89.8 (12.8) | 2.97 (−0.36 to 6.30) | 2.31 (−1.06 to 5.68) |
| | High | High | 314 | 88.9 (12.4) | 2.11 (−0.01 to 4.23) | 1.38 (−0.79 to 3.56) |
| WHR | Low | Low | 184 | 0.86 (0.06) | Referent | 0.177 | Referent | 0.476 |
| | Low | High | 224 | 0.85 (0.06) | −0.006 (−0.017 to 0.005) | −0.006 (−0.017 to 0.006) |
| | High | Low | 63 | 0.87 (0.06) | 0.01 (−0.007 to 0.026) | 0.007 (−0.010 to 0.024) |
| | High | High | 314 | 0.86 (0.06) | 0.002 (−0.009 to 0.012) | −0.001 (−0.012 to 0.010) |

Abbreviations: BMI, body mass index; CI, confidence interval; SES, socioeconomic status; WC, waist circumference; WHR, waist-to-hip ratio. *Fully adjusted model (social mobility + health behaviours + birthweight). Health behaviours include total calorie intake, percent fat in diet, alcohol consumption, smoking, and physical activity.
CONCLUSION
This study contributes to both the investigation of changing patterns of association between SES and adiposity, and the emerging understanding of life course effects of SES in low- and middle-income countries (LMICs), where the burden of excess adiposity is reaching alarming levels. It shows that the nature of the association and the effects of early-life SES on adiposity differ by gender. Among women, high SES is associated with lower adiposity and adult SES appears to be more important than childhood SES. In contrast, men displayed the opposite pattern with high SES being associated with higher adiposity, and adult SES being less important. These findings suggest women are experiencing the social transition (or reversal of the social gradient of excess adiposity) much faster than men.

LMICs are experiencing social changes affecting obesity risk at a much faster pace than populations in HICs. HICs experienced changes in dietary and physical activity patterns over several decades, affording them time for health services and public health systems to adapt to the changing disease profile in the population. The luxury of time may not be available for LMICs, and they may need to adapt much more rapidly to provide adequate prevention and health care delivery for excess adiposity and its complications.

In terms of research, the confounding structure of any given disease outcome in settings experiencing such rapid social and economic transition may differ from those in high-income countries, and gender specific effects of SES on adiposity appear to be more salient in LMICs. This makes the investigation of countries, and gender specific effects of SES on disease outcome in settings experiencing such rapid social and adequate prevention and health care delivery for excess adiposity (much faster than men. SES being less important. These findings suggest women are with high SES being associated with higher adiposity, and adult childhood SES. In contrast, men displayed the opposite pattern of excess adiposity) much faster than men.

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CONFLICT OF INTEREST
The authors declare no conflict of interest.

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