NÚMERO 436

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Economic Geography of Human Development: Stratified Growth in Bolivia, Brazil, Guatemala and Peru

DICIEMBRE 2008

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Acknowledgements

The author thanks Luis Felipe López Calva and Isidro Soloaga for the invitation to participate in the research and discussions conducted for the Regional UNDP Report on Inequality and Human Development in Latin America and the Caribbean, 2008/2009, which led to the present research.

El autor agradece a Luis Felipe López Calva y a Isidro Soloaga la oportunidad de participar en la investigación y discusiones realizados para el Reporte Regional de la PNUD sobre Desigualdad y Desarrollo Humano en Latinoamérica y el Caribe, 2008/2009, que dio origen a esta investigación.

Abstract

This article begins by constructing a model of stratified and divergent economic growth integrating economic geography, human development and endogenous technological change. Even in the presence of perfect capital, goods, and labor markets, economic geography and local governance can lead to stratification and divergence. The article then shows that early child development (ECD) determinants include both individual and local indicators of 1) regional macroeconomic wellbeing, 2) publicly provided goods, and 3) private goods, through 43 regions of Bolivia, Brazil, Guatemala, and Peru. The inequity impact of these various goods is quantified using a concentration index decomposition. Regions attracting migration have experienced higher ECD, and employment is key for ECD. The intergenerational dynamics of mean regional female height for age z-score (HAZ) are stratified and absolutely divergent. Backward regions lag four generations behind advanced regions at the current rate of HAZ change.

Keywords: Human development, economic geography, stratified economic growth, early child development, Latin America, Bolivia, Brazil, Guatemala, and Peru.

JEL Codes: I0, I3, O1, O5, R1.

Resumen

Este artículo construye un modelo de crecimiento económico estratificado y divergente que integra geografía económica, desarrollo humano y cambio tecnológico endógeno. Aun bajo la presencia de mercados perfectos de capital, bienes y trabajo, caracterísitcas locales de geografía económica y calidad de gobierno pueden conducir a la estratificación y la divergencia. Se muestra que los determinantes del desarrollo infantil temprano (DIT) incluyen indicadores tanto individuales como locales 1) de bienestar macroeconómico regional, 2) de la provisión de bienes públicos y 3) de bienes privados, a través de 43 regiones de Bolivia, Brasil, Guatemala y Perú. El impacto sobre la inequidad de estos tipos bienes se cuantifica descomponiendo el índice de concentración del DIT. En las regiones atractoras de migración es superior el DIT. Además, el empleo es clave para el DIT. La dinámica intergeneracional del promedio regional del índice-z (z-score of height for age) de la estatura femenina (HAZ) es estratificada y absolutamente divergente. Las regiones más deprimidas tienen un rezago de cuatro generaciones respecto de las avanzadas, a la tasa de cambio actual de HAZ.

Palabras clave: desarrollo humano, geografía económica, crecimiento económico estratificado, desarrollo infantil temprano, América Latina, Bolivia, Brasil, Guatemala y Perú.

Códigos JEL: I0, I3, O1, O5, R1.

Introduction

What are the structural forces that create and perpetuate extreme inequalities in human development? This urgent question continues to challenge policy makers concerned with overcoming extreme poverty, enhancing social welfare and accelerating progress towards the Millennium Development Goals.

This article constructs a simplified model of stratified and divergent economic growth that incorporates economic geography, human development and endogenous technological change.[1] The article then provides evidence for the impact on early child development (ECD) of both individual and local indicators of regional macroeconomic wellbeing, public provision of goods, and private goods levels, through 43 regions of Bolivia, Brazil, Guatemala, and Peru. What is shown here is that economic geography and local governance contribute to stratification and divergence in the intergenerational transmission of ECD. Moreover, regions with higher average adult female height for age z-score (HAZ) enjoyed higher intergenerational HAZ *increments*.

An inquiry into the role played by supply and demand in the transmission of education and health leads to a consideration of the role of economic geography. The reason is two-fold. On the one hand, the *demand* for human capital is rooted in the local economy, itself subject to the forces of economic geography. On the other, the *supply* of human capital depends on household assets and on the local provision of human capital goods —sanitation, schools, clinics, hospitals, universities. The first (household assets) is a byproduct of the local economy, and the second (local provision of human capital goods) is subject to the local demand for its services. Families seeking to endow their offspring with human capital thus make their investment decisions based on their individual resources and on local incentives and costs. Alternatively, if local conditions are bad enough, migration may become the best option. The theoretical model shows that —even in the presence of perfectly functioning labor, capital, and goods markets— an inequitable distribution of infrastructure, scale effects, and public goods provision across localities can generate stratification and divergence.

Early child development (ECD) is the foundation for life-long capabilities in the areas of health, education, and income. In developed countries, ECD is identified as a crucial stage of investment in human capital formation, with especially high returns (Heckman and Carneiro, 2003). Similarly, childhood health is placed at the origin of the 'gradient' of adult health along income (Case, Fertig, & Paxson, 2003; Case, Lubotsky & Paxson, 2002). Thus,

[1] The model builds on previous work on underdevelopment and divergence by Howitt and Mayer-Foulkes (2005), and by Aghion, Howitt and Mayer-Foulkes (2005).

inequities in ECD form the basis of the intergenerational transmission of inequality in human capital.

In Latin America and the Caribbean (LAC), problems in human capital investment are strong enough that there may be a long-term human development trap (Mayer-Foulkes, 2008)[2] in which low ECD makes schooling less productive, and schooling itself is not accessible to a large percentage of the population. Even so, the main problems generating persistent deficits in human capital accumulation remain unclear. Poverty and inequality did not decline in Latin America during the 1990s in spite of improvements at the macroeconomic level (Londoño & Székely, 2000). Here it is suggested that the externalities involved in economic geography, and problems in the provision of public goods generate inequities in human capital investment.

While many authors stress the importance of access to social and political rights for reducing inequality in LAC (e.g. Justino, Litchfield & Whitehead, 2003), and in spite of the importance of the dynamics generated by economic geography —as witnessed by the growth of cities, the extent of migration, and the polarization that tends to occur between regions— there are few studies on the impact of economic geography on human development.

The remainder of the present article is organized as follows. Section 2 discusses the long-term relationship between human development and economic growth, and the economic geography of human capital investment. Section 3 discusses endogenous technological change and economic growth, and then presents the model of stratified and divergent regional economic growth and human development. Section 4 contains the econometric analysis, including a description of the methods, the data and the results. The last two sections focus on a discussion and on conclusions.

2. Human Development, Economic Geography and Growth

(a) Human development and economic growth

Human development is a long-term intergenerational process through which human capacities are nurtured and expanded. Human development and economic growth are complementary. Human capacities provide the main input for production and technological change —labor, skills, and knowledge. In turn, the extent of human development depends on the resulting income and technology levels. Economic development has supported and been strengthened by momentous secular rises in stature, weight, life expectancy, and education.[3] Nobel Prize winning historical studies by Fogel and Wimmer

[2] The article presents a human development trap model and supporting evidence for its existence in Mexico. It also includes a literature review on ECD.

[3] Average stature rose from 164 to 181 cm in Holland between 1860 and 2002, and from 161 to 173 cm in France and Norway between 1705 and 1975. Average weight rose from 46 to 73 kg in Norway and France from 1705 to

(1992), and Fogel (1994) find that a third or even one half of the economic growth in England over the last 200 years is due to improvements in nutrition and health. Arora (2001) finds comparable results for seven advanced countries using 100- to 125- year time series of diverse health indicators. Significant long-term impacts of health on economic growth in Latin America are also confirmed by Mayer-Foulkes (2001). The synergism between technological and physiological improvements has produced a rapid, culturally transmitted form of human evolution that is biological but not genetic. This long-term process, which continues in both rich and developing nations, is called *technophysio evolution* by Fogel (2002). *Human development* is understood herein as this long-term process of technophysio evolution, to which the educational and cultural dimensions of attainment in the modern world are added. The scope for human development can, by itself, explain the universal emergence from stagnation to growth (Cervellati & Sunde, 2005).

Research on the secular health improvements found by work such as Fogel's (ibid) has led to a focus on early child development (ECD), the combination of physical, mental, and social development in the early years of life. Early childhood health is a critical link in the transmission of household wealth to the next generation, forming the basis for future adult income and health, and explaining the correlation between adult health and income (Case, Lubotsky & Paxson, 2002; Case, Fertig & Paxson, 2003). ECD, traditionally a blind spot in government policy, is now understood to be a crucial component of human capital formation with especially high returns (Heckman and Carneiro, 2003).

As mentioned above, stature is a population indicator of wellbeing and a predictor of life-long health and longevity. Most stature loss is determined irreversibly in the first two years of life (Schürch & Scrimshaw, 1987; Steckel, 1995). For this reason, stature can be used as an indicator of ECD, particularly nutrition.

It is widely accepted that the process of investment in nutrition, health, and education is beset by market failures slowing human development. In a separate article, I provide evidence for the presence of a long-term, intergenerational, low human capital accumulation trap in Mexico.[4] This poverty trap is characterized by attractive returns to both education and early child health and nutrition that remain untapped by a major portion of the population. That article also gives a model for a dynamic poverty trap describing long-term human development, defined in the context of endogenous technological change, and based on a credit constraint for human capital investment (but not on increasing returns).

1975. Life expectancy rose from 41 to 78 years in England between 1841 and 1998, and from 29 to 60 years in India between 1930 and 1990. (Fogel, 2002; Cervellati, Matteo & Uwe Sunde, 2005.)

[4] Mayer-Foulkes (2008), where further references on human development and early child development can be consulted.

Here I show instead that both the quality of local governance and impacts from economic geography can provoke stratified and divergent economic growth and human development across geographical localities. Evidence of the importance of these local characteristics for ECD is given for Bolivia, Brazil, Guatemala, and Peru.

(b) The economic geography of human capital investment

The importance of geographical forces in the process of development has been clear since Harris and Todaro's (1970) model of rural-urban migration. In fact, socioeconomic reality presents itself as a huge, complex, socio-geographic mosaic of heterogeneous regions, localities, and neighborhoods that feature within themselves varied degrees of homogeneity. This socio-geographic mosaic consists of *favelas*, rich or middle class neighborhoods, industrial cities, rural villages, and so on. Seeking to explain this reality, a whole literature on economic geography has emerged. Following Baldwin *et al*. (2003) review of the state of the art in this literature, I summarize here some of the main centripetal and centrifugal forces underlying economic agglomeration.

1. The market access effect due to proximity. Industrial concentration enlarges the size of markets accessible with low transportation costs. This, in turn, provokes higher agglomeration. Vertical linkages may play a further role here.
2. Economic specialization. When specialization must face fixed costs, industrial concentration makes it feasible, increasing the efficiency of production and provoking further agglomeration.
3. The cost of life effect. In regions where industry is concentrated, costs are also reduced for consumers. This can then result in lower salaries that attract other firms.
4. Sunk capital effect. Once accumulated, capital may be costly to move.
5. Excessive agglomeration effect. This increments competition and motivates industrial dispersion, counteracting forces for concentration.
6. Congestion costs. These limit the benefits of concentration.
7. Intensity of local technological and other knowledge externalities. These can incentivize technological change where there is concentration.
8. Decreasing returns to agriculture, a centrifugal force.

These economic forces interact with and mold local politics, local governance, and local public resource allocation. They are also at play in defining housing neighborhoods according to the provision of various publicly or privately provided goods in infrastructure, consumption, health, and education. The supply of sanitation, electricity, security, street quality, supermarkets, shopping centers, hospitals, and schools, is shaped by —and shapes— neighborhood structure, since it tends to face fixed costs and is a function of local aggregate demand, political voice, and so on. Another example of agglomeration forces occurs when the landless poor join forces and squat on land without property titles in the face of state opposition.

The full set of geographic economic forces strongly impacts the local economy, and affects the supply and demand of human capital in various ways. Firm demand for human capital will depend on the characteristics of the local economy, determined by transportation infrastructure, local resources, industrial agglomeration, the presence of agriculture, and so on. When choosing a location, firms will also compare the local supply of human capital with that of other localities. The supply of human capital responds to this demand, but it also depends on the cost of human capital investment. These costs depend on the health and education sectors providing human capital, and these sectors are also subject to the impact of geographical forces, for example, to scale effects. Thus, local economic geography and governance will have a strong impact on local human capital demand and supply.

In general, models in economic geography tend to be mathematically complex, beginning with the core-periphery model (Fujita *et al.*, 1999, Krugman 1991), which was one of the first. Therefore, a good part of the research effort in this area has consisted in finding mathematically tractable models. Examples are the footloose capital model, the footloose entrepreneur model, and the capital construction model. Models including technological change are the global and local spillovers models (Baldwin *et al.,* 2003). The model constructed in this article eschews these difficulties by resorting to aggregate local scale externalities, rather than increasing returns to scale, through specialization or other mechanisms generating scale effects.

For simplicity, we will assume that each locality’s economy can be described by a neoclassical aggregate production function based on capital and human capital, whose productivity is affected by local public goods representing the quality of governance and by a scale effect summarizing the various geographical impacts. Similarly, the human capital sector is described by a sectoral production function also affected by local public goods and a scale effect. The human capital sector provides access to skills at the local technological level. In turn, human capital absorbs new technologies that arise exogenously.

Thus, we construct a simplified model of local economic growth, human development, and technological change, whose parameters represent the impact of local governance and local economic geography on the demand and supply of human capital. The model shows that, even in the presence of perfect capital, labor, and goods markets, the resulting economic growth and human development can be stratified and divergent.

3. Stratified and Divergent Local Economic Growth: A Model

(a) Endogenous technological change and economic growth

Over a decade of research in cross-country economic growth has led to the consensus opinion that differences in per capita income between countries or regions are mainly due to differences in technology.[5] Thus, economic growth is, above all, the process through which technological levels of production rise. Models of endogenous technological change first concentrated on research and development (R&D) in developed countries as the source of economic growth (Aghion and Howitt, 1988, 1992) and convergence (Howitt, 2000). However, technological change can be broadly understood to include not only R&D but also imitation and technology adoption, and models of endogenous technological change can also be used to explain convergence clubs, underdevelopment, and divergence (Howitt and Mayer, 2005; Aghion *et al.*, 2005).

As discussed above, I define human development as the long-term process of technophysio evolution, to which the educational and cultural dimensions of attainment are added. Human development both depends on, and provides the input for technological change. Mayer Foulkes (2008) gives an example of a model of human development as a dynamic poverty trap interacting with technological change. This is a poverty trap with high and low steady states that, nevertheless, experience economic growth. The interaction between this trap and a low-technology trap for countries occurring under trade and foreign direct investment (FDI) due to endogenous asymmetries in innovation incentives is analyzed in Mayer Foulkes (2007).

The theoretical model constructed here incorporates geographic and governance effects on local economic growth and human development. It serves to fix ideas on how the socio-geographic mosaic pointed to above may be subject to stratified and divergent growth driven by endogenous technological change. The context is consistent with an open economy adopting technologies from abroad. Moreover, as it stands, the model can also represent cross-country growth under globalization.

[5] See Howitt and Mayer-Foulkes (2005, pages 1-2) for references to studies attributing cross-country differences in per capita GDP to differences in productivity.

(b) The model

Consider an economy subdivided into localities, and suppose that each locality's economy can be described by an aggregate production function[6]

$$(1)\ Y_t = [\psi(G_t / K_t)^{\pi} S(L_t)]^{1-\alpha} K_t^{\alpha} H_t^{1-\alpha}.$$

This is a Cobb-Douglass neoclassical production function for an aggregate local product Y_t with private physical and human capital K_t and H_t as inputs. α is the elasticity of capital and, from the private point of view, there are constant returns to scale. Local productivity is written as a function of a local fixed productivity effect ψ, a public capital level G_t —including the impact of infrastructure and the provision of public goods— and a scale effect $S(L_t)$ — expressed as a function of the local population level L_t— representing the impacts of agglomeration through economic geography, impacts on which private producers cannot make decisions. Assume that local government supplies public capital in proportion to private capital, and take $g^Y = G_t/K_t$ as a parameter describing local governance. For brevity, also write $s^Y = \psi S(L_t)$ as a parameter describing local geographic effects. For simplicity, assume first that population is constant.

Assume that the capital market is perfect so that the local returns r to physical capital are constant. These can correspond to the global or the national economy, according to whether the economy is open or closed. Then $r = \alpha(g^{Y\pi} s^Y H_t / K_t)^{(1-\alpha)}$, so

$$(2)\ K_t / H_t = (\alpha / r)^{1/(1-\alpha)} g^{Y\pi} s^Y.$$

Therefore, capital flows to the localities in proportion to human capital and according to the parameters describing local governance and geographic effects.

Next, let w_t be the returns to human capital. Then $w_t = w$ is constant, with

$$(3)\ w = (1-\alpha)(g^{Y\pi} s^Y)^{1-\alpha} (K_t / H_t)^{\alpha} = (1-\alpha)(\alpha / r)^{\alpha/(1-\alpha)} g^{Y\pi} s^Y.$$

Returns to human capital similarly depend on local governance and geographic parameters.

Suppose that each individual lives for one period and decides on the time τ_t and resources e_t per unit time invested in human capital h_t by maximizing life income

$$(4)\ y_t = w(1-\tau_t)h_t - e_t\tau_t.$$

Suppose further that human capital is produced locally according to the production function

[6] This is similar to standard assumptions in multi-country models of economic growth.

$$(5)\ \ h_t = g^{H\varepsilon} s^H A_t^{1-\chi} e_t^{\chi} \tau_t^{\sigma}\ .$$

Here, again, $g^{H\pi}$ and s^H are parameters representing the impact of local governance and geographic scale effects on the production of human capital. Write $B_t = w g^{H\varepsilon} s^H A_t^{1-\chi}$ for brevity. Individuals maximize:

$$(6)\ \ y_t = (1-\tau_t) B_t e_t^{\chi} \tau_t^{\sigma} - e_t \tau_t\,,$$

The first order conditions imply:

$$(7)\ \ \tau_t = \sigma/(1+\sigma),\ \ e_t = \left[\chi B_t/(1+\sigma)\right]^{\chi/(1-\chi)}.$$

The resulting human capital level is:

$$(8)\ \ h_t = \Phi z A_t,$$

where $\Phi = \left[\sigma/(1+\sigma)\right]^{\sigma} [\alpha^{\frac{\alpha}{1-\alpha}} (1-\alpha)\chi/(1+\sigma)]^{\frac{\chi}{1-\chi}}$ and $z = r^{\frac{-\alpha\chi}{(1-\alpha)(1-\chi)}} [g^{H\varepsilon} s^H]^{\frac{1}{1-\chi}} [g^{Y\pi} s^Y]^{\frac{\chi}{1-\chi}}$. The local level of human capital depends on the local governance and geographic parameters for the production of goods and human capital.

A short discussion is in order here. Equation (8) represents the local equilibrium level of human capital. Note that this level depends on a complex set of local conditions affecting both the production of goods and the production of human capital. For the purposes of the model, however, the main household and firm assets and flows are all set proportionally to the technological level. Consequently, the full set of economic geographic impacts is reduced to a single scale effect. For the econometric estimation, though, the scale effect will be thought of as a function of several mean aggregate variables.

Now consider technological change. Suppose, as is common in Schumpeterian models,[7] that innovators spend resources on adapting leading edge technologies to their own situation. Growth in the leading technological edge A_t^{LE} itself results from global research spillovers that are exogenous to the locality, with

$$(1)\ \ A_{t+1}^{LE} = (1+\gamma) A_t^{LE}$$

Suppose local innovators can create new technologies with probability μ_t. Then the local technological level increases according to:[8]

$$(2)\ \ \ A_{t+1} = \mu_t A_{t+1}^{LE} + (1-\mu_t) A_t.$$

7 For example Howitt and Mayer (2005), Aghion *et al.* (2005).

8 A full model for this requires taking into account a continuum of sectors and innovator profit maximization, with uniform probability of innovation across the locally produced subset of sectors.

For simplicity, assume that innovation is the result of learning by doing, and that the probability of innovation is:

$$(3) \quad \mu_t = g^I s^I h_t / A_{t+1}^{LE}.$$

Division by the leading technological edge A_t^{LE} accounts for the fishing out effect, implying that innovation at higher technological levels becomes proportionally more difficult. The parameters g^I and s^I describe the impact of local governance and geographic effects on innovation, as before.[9] Now define the relative technological level

$$(4) \quad a_t = A_t / A_{t+1}^{LE}.$$

Substituting (8) in (11), $\mu_t = \Omega a_t / (1+\gamma)$ where $\Omega = \Phi g^I s^I z$ represents the local propensity for innovation, which can be understood as the local competitiveness. Assume that $\Omega < 1$, so that the probability μ_t, is less than 1, independently of the growth rate of the leading technological edge. Substituting in equation (10), dividing by A_{t+1}^{LE} and using (9),

$$(5) \quad \frac{a_{t+1}}{a_t} = R(a_t) \equiv \frac{1}{1+\gamma} + \frac{\Omega}{1+\gamma}\left(1 - \frac{a_t}{1+\gamma}\right).$$

What we have here is a standard model of endogenous technological change. The decreasing linear function $R(a_t)$ represents the rate of growth of a_t, the locality's technological level relative to the leading edge technology. Comparing a_{t+1} with a_t, the first term expresses how the local technological level falls behind the leading edge if there is no innovation. The second term expresses the relative advance that results from innovation. This is a multiplication of two terms. The first is the local propensity for innovation Ω, which expresses the frequency with which innovations take place. As we saw before, this term is a composite description of local governance and geographical impacts, as they impact the aggregate production of goods, human capital, and the probability of innovation. The second term is the distance of local technologies to the new frontier, that is, the technological jump that will be obtained by putting new technologies into place. This second term expresses Gerschenkron's (1952) *advantage of backwardness*, the advantage innovators experience when they can benefit from the existence of higher, leading technologies elsewhere, a technological force for convergence. If the local propensity for innovation Ω is high enough, a locality starting from low relative technological levels will experience catch up until the force of relative decay equals that of innovation. If, instead, Ω is too low,

[9] The expression for μ_t can also be obtained from innovator profit maximization (rather than learning by doing) by letting μ_t be a Cobb Douglass function of local human capital level h_t and material resources invested in innovation, divided by the leading technological edge (such as in Howitt and Mayer, 2005).

relative decay will be inevitable and the locality will diverge, growing slower than the leading edge and falling relatively, ever farther behind. All together, if Ω's vary sufficiently between localities, what occurs is a combination of stratified and possibly divergent growth. Recall that human and physical capital, as well as income, grow in proportion to the technological level.

Proposition 1. There are two types of steady states a . The first occurs if $\Omega \geq \gamma$, satisfies $R(a\ ) = 1$, and describes trajectories in which the local technological level A_t converges to a path parallel to the leading edge technology A_t^{LE}, with growth rate γ. The second type occurs if $\Omega < \gamma$, satisfies $a\ = 0$ and $R(a\ ) < 1$, and describes conditions under which the local technological level A_t grows at a rate $\Omega < \gamma$ lower than that of the leading edge technology.

Observe that capital, labor, and goods markets are perfect in the model. Nevertheless, differences derived from local productivity fixed effects, the provision of local public goods, and scale effects following from economic geography, can result in stratification and divergence of human development and economic growth across localities.

The next step is to briefly consider the impact of population change. Suppose now that there are *N* localities indexed by *i* which we now include in the notation. Suppose further that population growth and migration between localities are functions of the economic variables. For example, let $\mathbf{L}_t = (L_{it})$, $\mathbf{y}_t = (y_{it})$, be the vectors of populations and expected incomes across localities, and suppose that children migrate according to their expected income in their own or other localities. Then

$$(6) \qquad \mathbf{L}_{t+1} = \mathbf{F}(\mathbf{y}_{t+1}, \mathbf{L}_t).$$

If this equation in $\mathbf{L}_{t+1}$ can be inverted (recall that $\mathbf{y}_{t+1}$ is a function of $\mathbf{L}_{t+1}$), the vector of local propensities for innovation becomes a function of the present population $\mathbf{\Omega}_{t+1} = \mathbf{\Omega}_{t+1}(\mathbf{L}_t)$ that forms a system with equation (13). As population migrates, local geographic effects change, and with them the local propensity for innovation and the trajectory of technological change. Under conditions which for simplicity need not be specified here —for example if population growth or scale effects are bounded— the changing trajectories may converge to a steady state. Then the model will describe migration, stratified growth, and divergence.

4. Econometric Analysis

(a) The analysis

We analyze three ECD indicators in a joint DHS data base on Bolivia, Brazil, Guatemala, and Peru. The surveys include a series of individual and local variables. They are representative at the regional level for 43 regions across these four countries, allowing the definition of a series of regional aggregate variables in addition to the local variable.

The ECD indicators are:

1. Proportion of vaccinations received.
2. Health status indicator based on chronic malnutrition indicators, last child's birth weight, prevalence and intensity of diarrhea, and morbidity in last two weeks.
3. Height for age z-score (HAZ) for children ages five or less.

The analysis consists of, first, a regression showing that there is a quantitatively and statistically significant dependence of the individual ECD indicators on local and regional variables (after controlling for individual household variables). The regional variables are indicators of regional governance and economic geography. The results show that these are indeed significant determinants of individual wellbeing.

Second, using the previous regressions, the CI decomposition (Wagstaff and van Doorslaer, 2000) is estimated for these three ECD indicators along a socio-economic status indicator. This provides a measure of the roles these individual and local indicators play in the intergenerational transmission of inequities.

Third, I regress girls' against mothers' HAZ, the only indicator making an inter-temporal comparison possible, and show that HAZ intergenerational dynamics across regions are divergent.

Consider a set of individuals $i \in I$ living in regions $j \in J$, where a mapping $\rho: I \to J$ defines for each individual the regions in which he lives. For any variable $\mathbf{X}_i$, define $\overline{\mathbf{X}}_j$ as the mean of $\mathbf{X}_i$ in region $j = \rho(i)$. Because the surveys we use are representative at the regional level, these *regional mean* variables are meaningful measures of regional characteristics. Let $\mathbf{X}_i$, $\mathbf{D}_i$, be vectors of individual determinants of the ECD indicator V_i, and let $\overline{\mathbf{X}}_j$, $\mathbf{S}_j$, be vectors of regional determinants of this same indicator, where $j = \rho(i)$. Note some of these are aggregates (regional means) of individual variables. We therefore estimate the ECD indicators according to:

$$(7) \quad V_i = v_0 + \left(\boldsymbol{\alpha}^X \mathbf{X}_i + \boldsymbol{\alpha}^D \mathbf{D}_i\right) + \left(\boldsymbol{\beta}^X \overline{\mathbf{X}}_j + \boldsymbol{\beta}^S \mathbf{S}_j\right)$$

This is the econometric version of equation (8). The α*'s* and β*'s* are coefficient vectors.

What is the effect on the regressions of considering a regionalization that is not sufficiently fine? That is, suppose (14) would be true for a finer regionalization. Averaging observations to our actual, less fine regionalization does not bias the coefficients, except that a lower number of observations can bias them towards zero. The main effect is thus only an increased error term.

Let us now consider $C(V;z)$, a concentration index (CI) for some ECD indicator *V* with respect to a socioeconomic status variable *z*, which in this case is a more reliable variable than income.[10] Wagstaff, Van Doorslaer, and Watanabe (2003) provide a decomposition of the CI which, in this case, reads as follows.

$$(8)\quad C(V_i;z)=\left(\sum_k \alpha_k^X \frac{\mu(X_{ik})}{\mu(V_i)}C(X_{ik};z)+\sum_k \alpha_k^D \frac{\mu(D_{ik})}{\mu(V_i)}C(D_{ik};z)\right)$$

$$+\left(\sum_k \beta_k^X \frac{\mu(\bar{X}_{jk})}{\mu(V_i)}C(\bar{X}_{jk};z)+\sum_k \beta_k^S \frac{\mu(S_{jk})}{\mu(V_i)}C(S_{jk};z)\right)+\frac{1}{\mu(V_i)}GC(\xi_i)$$

Here $\mu(\cdot)$ represents the mean over the whole sample. Note that the constant term disappears in the decomposition. The first parenthesis represents that part of ECD that is correlated with individual variables $\mathbf{X}_i$ and $\mathbf{D}_i$, with subscripts *k* denoting the vector components; and the second parenthesis represents that part of ECD that is correlated with local variables $\bar{\mathbf{X}}_j$ and $\mathbf{S}_j$. $GC(\xi_i)$ represents the generalized CI for the error term. Expression (15) decomposes inequity according to individual and local determinants.

(b) The data

The dataset brings together the joint Demographic and Health Surveys (DHS) for Bolivia (1997), Brazil (1996), Guatemala (1998), and Peru (1996). From the rather full set of questions a series of indicators are constructed using *categorical principal components analysis* (CATPCA), as in Mayer-Foulkes and Larrea (2005).[11] This methodology is not restricted to numerical and dummy variables, and directly handles categorical variables.

The main dependent variables are the three ECD indicators mentioned above, vaccinations, health status, and HAZ. The independent individual variables are indicators for basic household quality, household goods, education, mother's HAZ, mother's employment, employment (a quality index for both spouses' employment), indigenous dummy, children's age, mother's age, number of children and current place of residence and place of birth (countryside, town, small city, large city), and a migration variable defined as the number of steps taken up this density ladder. This variable was more

[10] Assuming ECD is equally needed across socioeconomic status, inequality measures inequity.

[11] That paper uses a CI decomposition of ECD indicators to study how ethnic indicators are associated with inequity.

significant than just the dummy variable, or than an indicator also taking into account "downward" steps. See Table 1.1 (all tables are at the end of the document) for a summary definition of the CATPCA indicators. These indicators are all normalized from 0 to 100 for the regressions.

Besides place of residence and country dummies, the local variables used as ECD determinants are the means of the indicators mentioned above, by regions for which the survey is representative. Mean basic housing quality reflects basic public services. Mean housing goods measures local income per capita. Finally, the mean of the migration variable measures to what extent a region attracts population and is, therefore, a development pole.

The distribution of observations of the DHS surveys between the four countries, Bolivia, Brazil, Guatemala, and Peru is found in Table 1.2. Descriptive statistics of the variables used are found in Table 1.3.

Three levels of educational status were constructed to conduct the CI decomposition within socioeconomic strata of the population. These were very low, low, and medium, constructed according to our CATPCA Education index for households following the criteria shown in Table 2.1, which also shows the distribution of educational levels across the joint and specific country samples.

To situate these educations levels in terms of schooling and literacy, Table 2.2 shows the mean levels of women's schooling and husbands' schooling for each of these educational status levels, as well as women's de facto literacy according to the following categories: does not read, reads with difficulty, reads fluently.

On average, both women and their husbands have incomplete primary schooling in "very low" education households, primary schooling in "low" education households, and lower secondary schooling in "medium" education households. A major portion of women in very low education households in practice cannot read, while 70% read fluently in low and 90% in medium education households.

Table 2.3 shows the geographic regions and the distribution of the population amongst them by educational levels. Table 2.4 shows the correlation matrix for the three ECD indicators. Because geographic stratification is endogenous, individual and local characteristics are correlated. This can be appreciated in Table 2.5, showing the correlations for the main individual and local variables. In the estimates, the endogenous choice of region is controlled by the migration variable described above. Observe also that the regional mean of the migration variable is strongly correlated with individual socio-economic status, basic household quality, and household goods, consistently with indicating the most developed regions.

(c) Results

(i) Regression results

The individual variables used for the regression and CI decomposition are, first, a series of indicators constructed using CATCPA: basic household quality, household goods, education, mother's HAZ, mother's employment, and employment. Second, additional individual indicators: indigenous dummy, children's and mother's age, number of children, and dummies for born in city, town or countryside (capital or big city left out). The local variables used in the decomposition are, first, dummies for living in small city, town or countryside (capital or big city left out), and country dummies for Peru, Bolivia, and Guatemala (Brazil left out). Second, regional means for the individual variables: basic household quality, household goods, education, mother's HAZ, mother's employment, and employment. These regional mean variables reflect local aggregates in basic public services, income, education, adult life-long health, and female and aggregate employment; for comparison, they are used in one set of estimates and omitted in another. When the regional mean variables are significant in the presence of the individual variables it is clear that the aggregate is significant, independently of the individual variable.

The decomposition methodology follows the theoretical and computational methods in Wagstaff *et al.*, (2008). Two sets of CI decompositions were implemented for each of our main ECD indicators, access to vaccinations, health status, and children's HAZ (for children ages zero to five). As before, the first set includes the regional mean variables and the second does not. The decomposition is performed for the full sample and also for the sub samples corresponding to very low, low, and medium educational statuses.

All of the independent variables, being parental and regional indicators, are exogenous to errors in the three ECD indicators. However, error correlation is expected within geographical regions. Hence, regionally clustered robust estimates are used. This also eliminates biases that may be associated with the use of regional contextual variables, which could be correlated with the regional errors structure.

The set of independent variables is a fairly complete set of individual and regional economic indicators that are adequate for exploring the economic component of our ECD indicators. The results are shown in Tables 4.1.1 to 4.2.3 (the middle digit represents the decomposition set, and the final digit the ECD indicator being analyzed). When the regional mean variables are included, the results for the non-mean local variables change considerably in magnitude and become more significant. The fairly good R-squared of about 50% does not change that much. Thus, the preferred regressions are the ones including the regional mean variables.

As expected, the coefficients of individual indicators of basic household quality, household goods, and employment are positive and mostly very significant; while the coefficients of mother's employment, indigenous dummy, and number of children are negative and significant. Also very significant for health status and children's HAZ (but not for access) are: mother's HAZ, with the expected positive sign, and children's age, with the expected negative sign indicating increased health status but cumulative height loss with age. Born in town or countryside is significantly negatively associated with vaccination access and with health status, but not with stature loss. Place of birth is significant especially for health status in the case of low education. Education is positive and significant.

With regards to individual indicators referring to the locality compared to the capital or big cities, living in a small city, in a town or in the countryside significantly lowers access to vaccinations, in that order, but not so clearly in the case of the health status indicator. This pattern of results is maintained whether regional mean variables are included or not. The regional mean variable most systematically affecting inequity is the migration indicator, over and beyond the significance of the individual indicator. Regions attracting migration have higher ECD. Also, mean mother's HAZ significantly affects access to vaccinations and health status. This may mean that several dimensions associated with aggregate welfare and beneficial for ECD (about 50% of whose variation remains to be explained) are not included in the estimates. In addition, observe that basic household quality is a significant predictor of vaccination access, and household goods is a significant predictor of health status and HAZ. Mean regional education, surprisingly, obtains a significant negative sign in the case of access to vaccinations. Note, finally, that at the low educational level most of the regional indicators are significant for vaccination access.

(ii) Concentration index decomposition results

The ranking variable along which concentration is measured is individual socioeconomic status, an overall measure constructed by including household quality, household goods, employment, income, education, and health indicators. By projecting on this ranking variable, the CI decomposition provides a measure of the impact of each dependent variable's equity on each independent variable's equity.

The CI for the three ECD indicators for children ages zero to five is shown in Table 3.1. The first column is the CI for the full sample representing the four countries. The next three columns show the CI results according to the education levels mentioned above. Since these omit concentration between education levels, the inequity measures are somewhat lower. All of the results are significant. According to our measures, the CI for vaccination access is higher than those for health status or children's HAZ. However, it must be noted that CI comparisons are not independent of the origin chosen for each variable.

The regression results show that many of the individual economic indicators, as well as some of the local and regional mean indicators, are significantly associated with the transmission of inequity in our ECD indicators. The results are shown in Tables 5.1.1 to 5.2.3 (the significance appearing in these tables is the significance of the coefficients in the decomposition regressions just examined). Observe that there are both positive and negative contributors to ECD concentration. These add up to 100% (except for numerical error) because socioeconomic status is a linear combination of a subset of the dependent variables, and is, therefore, not correlated with the error term.

The most important positive individual contributors to ECD concentration are basic household quality and employment, followed by household goods and education, with indigenous dummy and number of children being smaller but consistently significant contributors. Also positive and significant for health status and children's HAZ (but not for vaccination access) is mother's HAZ. Mother's employment is perversely associated with lower inequities in that the increased equity is associated with lower ECD. Indigenous dummy, however, although also associated with lower ECD levels, does not, therefore, lower inequity. The same holds for being born in the countryside, in the case of vaccination access and health status at very low levels of education. The country dummies give quite varied results across educational levels.

Now let us turn to local and regional mean variables. The most important, systematic contributor to inequity is mean migration inflow. Inequities in regions' attractiveness for migrants are associated with inequities in ECD. Living in the countryside is also systematically significant, but with a negative sign, signifying more ECD homogeneity in the countryside than in the reference, capital cities. Mean mother's HAZ is also especially significant for access to vaccinations, an association that could be related with non-economic mechanisms such as political voice or culture. Basic household quality inequity is associated with inequity in access to vaccinations, and inequity in household goods with inequities in health status and HAZ.

The results show that inequities in local and regional economic indicators have strong associations with inequities in ECD. Also, the migration indicator plays an important role, underlying a strong interconnection between development and migration. A more refined regionalization could yield a higher significance and magnitude for the coefficients of indicators such as basic household quality and household goods. However, as in the Harris and Todaro (1970) model, migration tends to equilibrate welfare between regions. This tends to reduce the significance of regional welfare differences by reducing population in geographically worse localities and incrementing it where conditions are better.

To get a better idea of the magnitude of migration, Table 6.1 shows the population composition in each type of place of residence according to each type of place of birth. Migration is motivated by seeking higher wages not only for unskilled labor, but also for skilled labor necessitating human capital investment (Djajic, 1985) and the associated wellbeing. The four auxiliary descriptive regressions in Table 6.2 show, independently of the mechanisms concerned, that individual migration is associated with higher human capital levels, as measured by parental education level and the three ECD measures, vaccinations, health status, and HAZ. Individual migration receives a consistently positive and significant coefficient after controlling for place of birth, place of residence, children's and mother's age, and number of children (an indicator of parental fertility preferences).

(iii) Convergence style regressions for height for age z-score

The ECD estimates shown above do not include an intertemporal dimension, because they are based on cross-section data. However, regressing daughters' against mothers' HAZ, makes it possible to obtain a perspective of the long-term dynamics of human development. Not only are daughters' and mothers' HAZ comparable in that they measure the relative position of each in the reference stature distribution for their age group, but, as mentioned above, since most stature loss is determined irreversibly in the first two years of life (Schürch & Scrimshaw, 1987; Steckel, 1995), both measures reflect the conditions each faced in early childhood.[12] Figure 1.1 (all figures are at the end of the document) shows a scatter plot of daughters' against mothers' mean regional HAZ for the 43 regions considered in the analysis. There is a strong correlation between these measures. Daughters are taller where mothers are taller. Figure 1.2 shows the same comparison in a dynamic form, showing a scatter plot of the mean intergenerational HAZ change against the initial mothers' HAZ. The positive correlation is evidence of divergence in these dynamics. Daughters' mean HAZ improved more in those regions where mean HAZ was higher to begin with. Figures 2.1 and 2.2 are similar, but use, instead, household socio-economic status on the horizontal axis. This shows that daughters' mean HAZ improved most in regions where average socioeconomic status was higher.

Table 7.1 shows regressions on the intergenerational change in HAZ (ΔHAZ) at the individual level. The regressions use robust regionally clustered estimates. Since genetic factors are relevant to stature, what is observed is a convergent process with regression to the mean. The coefficients for mother's HAZ are negative in both the absolute and the conditional cases (Regressions 1 and 2).

However, HAZ is best thought of as representing a population measure of wellbeing, abstracting at this level from genetic variation. Regression 3 serves

[12] HAZ was rescaled to range on the interval (0,100) for the regressions and CI decomposition, but not for the convergence regressions and figures in this section.

to predict the economic component of ∆HAZ. Regressions 4 and 5 for the regional mean of this component show there is absolute divergence and conditional convergence. The high number of observations makes the results highly significant. This implies —as in the model— that much of the intergenerational transmission of HAZ is economic, and that these economic indicators account for the observed absolute regional divergence. When these regressions are replicated at the regional level, absolute divergence is corroborated. However, the degrees of freedom are too low for conditional convergence regressions to be significant.

Figure 3 shows mothers' and daughters' mean regional HAZ for the 43 regions considered in the analysis, illustrating the concept of stratified human development. The most backward regions lag four generations behind the most advanced regions at the current rate of HAZ change. To summarize, there is conclusive evidence for absolute divergence in the stratified regional dynamics of the inter-generational transmission of the economic component of HAZ.

5. Discussion

We have attempted to identify the dynamics that characterize inter- and intra-generational inequality in human capital investment in four countries with a combined population of 237 million people, 42.8% of the Latin American population. Asking how inequities in the transmission of education and health may be related to a framework of supply and demand has led to a study of the impact of economic geography and local governance on human development.

The intergenerational transmission of human capital is a long-term process and, consequently, its examination must take long-term development as its context. One of the main features of development has been the huge transformation from an agrarian, rural economy to an urban industrial and service economy. Human development forms an integral part of this process and occurs in the context of the incentives that drive it. The estimates presented above confirm this, presenting a broad picture of the sources of inequity in the transmission of human capital that range from individual family assets, through the impact of local aggregate indicators of wellbeing, to migration.

At the individual level, ECD inequities are positively associated with inequities in employment, basic household quality, household goods, education, and being born in the countryside (in order of magnitude). By contrast, mother's employment has a negative association. These indicators reflect the main dimensions of individual household welfare.

At the local level, living in the countryside is associated with lower levels of inequity, compared to large or capital cities. This association occurs at low education levels, though, according to Table 6. Also, region-level inequities in basic household quality and mother's HAZ are associated with region-level inequities in vaccination access, while mean regional household goods levels are associated with health status and HAZ respectively. (As mentioned above, when the regional mean variables are significant in the presence of the individual variables it is clearly the *aggregate* that is significant.)

Finally, mean regional migration inflow, but not individual migration, is strongly associated with higher ECD levels at all educational levels. Migration inflow measures how much a region has been a development pole. This means that children living in development poles fared better than children from other regions.

Three kinds of goods are being considered here according to their economic characteristics. The first are indicators related to *regional macroeconomic wellbeing*. Individual employment and mean regional migration inflow lie in this category and are quantitatively and statistically highly significant. Besides being an indicator of household economic vulnerability, employment is related to economic geography, in that employment may be persistently high in flourishing regions and low in declining regions. The second are *publicly provided goods* such as potable water, sanitation and electricity, as well as cost of access to basic construction materials. Basic household quality and much of education are in this category. The third are *privately provided goods*, such as household goods.

The regressions and CI decomposition show that each of these categories of goods plays a considerable role in the intergenerational transmission of ECD inequities, itself based on family welfare. That ECD depends on regional macroeconomic well-being, publicly provided goods, and private wealth corresponds directly with the model presented above: the dynamics of economic geography and local governance are direct determinants of human development. Moreover, these regional dynamics generate high enough differences that intergenerational change in HAZ has been divergent across regions.

Many of the problems for raising levels and equity in these various categories of goods do not respond to a simplistic *laiser faire* market approach. For example, regional macroeconomic wellbeing and employment requires infrastructure investment and considerations of economic geography involving a series of fixed costs and scale effects. Individual access by the poor to publicly provided goods, to essential assets in health, education and household quality, and to goods whose supply depends on local aggregates, requires voice and good governance, in sum, policies that effectively address the needs of the poor and the most poor. In the absence of equitable governance, this access tends to be correlated with individual wealth; note in Table 2.5 the high correlations between individual wellbeing variables and regional mean variables. One obvious mechanism through which this occurs is the price of land for housing, which partly reflects the availability of public goods and social externalities. Other mechanisms work through political economy. Finally, the market is not very good at reducing inequities in the distribution of private wealth.

Conclusion

This article presents a model of regional economic growth and human development driven by endogenous technological change showing that regional differences based on economic geography dynamics and local governance can lead to stratification and divergence. Econometric estimates show that, indeed, both individual and local indicators of regional macroeconomic wellbeing, public provision of goods, and private good levels intervene as determinants of ECD. Mean regional migration inflows, which indicate the degree to which regions are development poles, turn out to be a particularly salient indicator.

Human development occurs in the context of local incentives and costs determined by local economic conditions and perspectives. Barriers to migration, industrial scale effects, and deficiencies in transportation infrastructure translate into barriers for human capital investment, thus leading to persistent inequities.

Inequities in ECD —which form a crucial link in the intergenerational transmission of inequity— depend on a broad spectrum of inequities in private, public, and local goods that support family well-being as a whole, and whose provision is geographically correlated with socioeconomic status.

To reduce these inequities, public policies must address all of these areas and be tailored to local needs. It may even be appropriate to promote the formation of development poles and facilitate migration. The geographical and governance determinants we have mentioned are not subject to improvement through simplistic market policies. In this context, it is not so surprising that economic inequities are so persistent, and that they are so resistant to policies of market and macroeconomic reform. While market-based policies may yield beneficial results, improving local governance so as to improve local economic performance and local human development is essential to achieving higher rates of human development and poverty reduction. What is required is the implementation of much more sophisticated local governance and regional development policies that can make the critical economic investments —nowadays in the context of globalization— and also sustain ECD.

Appendix A. Proof of Proposition 1

Proof of Proposition 1. Observe that $R(a_t)$ is decreasing and satisfies $R(1) < 1$, because

$$R(1) = \frac{1}{1+\gamma} + \frac{\Omega}{1+\gamma}\left(1 - \frac{1}{1+\gamma}\right) < \frac{1}{1+\gamma} + \left(1 - \frac{1}{1+\gamma}\right) = 1.$$

Note also

$$R(0) = \frac{1+\Omega}{1+\gamma} \geq 1 \text{ if and only if } \Omega \geq \gamma.$$

Hence if $\Omega \geq \gamma$, a unique value $a*$ exists on the interval $[0,1)$ at which $R(a*) = 1$. At this value there is a steady state because $a_{t+1} = a_t$, and the local technological level is given by $A_t = a\ A_t^{LE}$. If, instead, $\Omega < \gamma$, then $a_{t+1} = R(a_t)a_t < R(0)a_t$ decreases geometrically towards zero, which is therefore a steady state. Near this steady $A_{t+1} \approx A_{t+1}^{LE} R(0) A_t / A_t^{LE} = (1+\Omega) A_t$, so the local technological level has a growth rate $\Omega < \gamma$.

References

Aghion, P., Howitt, P., & Mayer-Foulkes, D. (2005). The effect of financial development on convergence: Theory and Evidence. *Quarterly Journal of Economics, 120* (1), 173-222.

Arora, S. (2001). Health human productivity and long-term economic growth. *Journal of Economic History,* 61 (3), 699-749.

Baldwin, R. *et al.*(2003). *Economic geography and public policy*. Princeton University Press. Princeton, N.J.

Case, A., Fertig, A., & Paxson, C. (2003). From cradle to grave?: The lasting impact of childhood health and circumstance. *NBER Working Paper 9788*. Cambridge, MA: National Bureau of Economic Research.

Case, A., Lubotsky, D., & Paxson, C. (2002). Economic status and health in childhood: The origins of the gradient. *American Economic Review, 92* (5), 1308-1334.

Cervellati, M., & Sunde, U. (2005). Human capital formation, fife expectancy and the process of economic development. *American Economic Review*, *95* (5), 1653-1672.

Djajic, Slobodan (1985). Human capital, minimum wage and unemployment: A Harris-Todaro Model of a developed open economy, *Economica*, London School of Economics and Political Science, vol. 52(208), 491-508, November.

Fogel, R. W. & Wimmer, L. T. (1992). Early indicators of later work levels, disease, and death, *NBER Historical Working Papers 38*, National Bureau of Economic Research.

Fogel, R. W. (1994). Economic growth, population theory, and physiology: The bearing of long-term processes on the making of economic policy. *American Economic Review,* 84 (3), 369-395.

Fogel, R. W. (2002). Nutrition, physiological capital, and economic growth. Mimeo, Pan American Health Organization and Inter-American Development Bank. http://www.paho.org/English/HDP/HDD/fogel.pdf.

Fujita M., Krugman P. and A. Venables (1999). *The spatial economy: Cities, regions and international trade,* Cambridge Mass., MIT Press.

Gerschenkron, A. (1952). Economic backwardness in historical perspective. In B. F. Hoselitz (Ed.), *The progress of underdeveloped areas* (pp. 3-29). Chicago, University of Chicago Press.

Harris J. and M. Todaro (1970). *Migration, unemployment & development: A two-sector analysis. American Economic Review,* 60(1), 126-42, March.

Heckman, J. & Carneiro, P. (2003). Human capital policy. *NBER Working Paper 9495*. Cambridge, MA, National Bureau of Economic Research.

Howitt, P., & Mayer-Foulkes, D. (2005). R&D, implementation and stagnation: A Schumpeterian theory of convergence clubs. *Journal of Money, Credit and Banking,* 37 (1), 147-177.

Howitt, Peter. (2000). Endogenous growth and cross-country income differences. *American Economic Review*, 90, 829-846.

Justino, P., Litchfield, J. & Whitehead, L. (2003). The impact of inequality in Latin America, *PRUS Working Papers 21,* Poverty Research Unit at Sussex, University of Sussex.

Krugman, Paul (1991). "Increasing returns and economic geography," *Journal of Political Economy* 99, 483-499.

Londoño, J.L. & Székely, M. (2000). Persistent poverty and excess inequality: Latin America, 1970-1995, *Journal of Applied Economics*, vol. III, 93-134, May.

Mayer Foulkes, D. and C. Larrea (2005), "Racial and ethnic health inequities: Bolivia, Brazil, Guatemala, and Peru, CIDE Working Paper 333, Mexico.

Mayer-Foulkes, D. (2001). The long-term impact of health on economic growth in Latin America, *World Development*, 29(6), 1025-1033.

Mayer-Foulkes, D. (2007). Globalization and the human development trap. Available at
http://www.wider.unu.edu/publications/working-papers/research-papers/2007/en_GB/rp2007-64/.

Mayer-Foulkes, D. (2008). The human development trap in Mexico". *World Development*, Vol. 36(5), 775-796.

Schürch, B., & Scrimshaw, N. S. (Eds.) (1987). *Effects of chronic energy deficiency on stature, work capacity & productivity.* Lausanne, Switzerland: International Dietary Energy Consultancy Group.

Steckel, R. (1995). Stature & the standard of living. *Journal of Economic Literature,* 33 (4), 1903-1940.

Van Doorsaler E, Andrew J. (2002). "Inequities in self-reported health: validation of a new approach to measurement", mimeo.

Wagstaff A, van Doorslaer E. (2000). Measuring and testing for inequity in the delivery of health care. *Journal of Human Resources,* vol. 35(4), 716-733.

Wagstaff, A., E. Van Doorslaer, and N. Watanabe (2003). On decomposing the causes of health sector inequalities, with an application to malnutrition inequalities in Vietnam, *Journal of Econometrics*, 112(1), 219-27.

Wagstaff, Adam *et al*. (2008). *Analyzing Health Equity Using Household Survey Data: A Guide to Techniques and their Implementation*. World Bank, Washington.

Table 1.1 Variables Included in Indicators Constructed From DHS Datasets Using Categorical Principal Components Analysis

Index	Variables used
Education	Schooling for adults 24 and over
	Literacy for people 15 years and older
	Access to higher education for adults 24 and over
	Primary school enrolment ages 6 to 11
	Secondary school enrolment ages 12 to 17
	Higher school enrolment ages 18 to 24
Basic Household Quality	Drinking water source
	hygienic service
	Floor materials
	Number of bedrooms per person
	Square root of time to obtain water
	Electricity
Household Goods	Radio
	Car
	Television
	Refrigerator
	Bicycle
	Telephone
Employment	Schooling of woman in fertile age
	Spouse's schooling
	Woman's occupation group
	Spouse's occupation group
	Woman's occupation category
	Woman's working time
Socioeconomic Status	Indicators for Education, Basic Household Quality, Household Good and Employment
Children's Vaccinations	Proportion of vaccinations received by last child out of total
Children's Health Results	Indicator of chronic malnutrition controlled by child's age group
	Type of weight at birth of last child
	Prevalence and intensity of diarrhea of last child in last two weeks
	Morbidity of last child in last two weeks

Table 1.2 Observations in Multi-country Sample

Country	Obs	Percent of sample with education index		
		Very Low	Low	Middle
Peru	13,682	26.7	57.2	16.1
Bolivia	5,381	28.6	58.2	13.2
Guatemala	3,588	68.6	30.2	1.3
Brazil	3,716	39.9	55.2	4.9

Table 1.3 Descriptive Statistics: Mean and Standard Deviation

Variable	Sample restricted to education level			
	Any	**Very Low**	**Low**	**Middle**
Basic household quality	60.69 (24.12)	49.87 (22.87)	63.46 (23.05)	79.73 (15.54)
Household goods	54.9 (26.08)	41.4 (21.83)	58.46 (25.17)	78.13 (18.9)
Education	34.58 (13.87)	21.38 (6.55)	36.83 (4.4)	62.86 (8.64)
Mother's height for age	54.93 (5.79)	53.43 (5.77)	55.37 (5.66)	57.27 (5.35)
Mother's employment	48.97 (30.3)	41.52 (32.06)	49.71 (28)	67.25 (26.6)
Employment	35.95 (19.78)	25.92 (17.05)	36.64 (16.45)	61.98 (15.94)
Indigenous	0.19 (0.39)	0.33 (0.47)	0.13 (0.34)	0.02 (0.15)
Children's age	2.45 (1.43)	2.42 (1.44)	2.46 (1.43)	2.48 (1.41)
Mother's age	3.4 (1.4)	3.6 (1.58)	3.21 (1.29)	3.63 (1.23)
Number of children	1.57 (0.66)	1.66 (0.69)	1.56 (0.66)	1.3 (0.52)
Born in City	0.12 (0.32)	0.05 (0.22)	0.13 (0.34)	0.23 (0.42)
Born in Town	0.25 (0.43)	0.22 (0.41)	0.28 (0.45)	0.21 (0.41)
Born in Countryside	0.44 (0.5)	0.67 (0.47)	0.36 (0.48)	0.09 (0.28)
Migration Variable	1.68 (0.95)	2.17 (0.86)	1.52 (0.92)	1 (0.65)
Live in Small City	0.13 (0.33)	0.07 (0.26)	0.14 (0.35)	0.21 (0.41)
Live in Town	0.13 (0.33)	0.1 (0.31)	0.14 (0.35)	0.13 (0.33)
Live in Countryside	0.48 (0.5)	0.73 (0.44)	0.41 (0.49)	0.13 (0.34)
Peru Dummy	0.37 (0.78)	0.25 (0.67)	0.44 (0.84)	0.38 (0.73)
Bolivia Dummy	0.52 (0.5)	0.4 (0.49)	0.56 (0.5)	0.7 (0.46)
Guatemala Dummy	0.2 (0.4)	0.17 (0.37)	0.22 (0.42)	0.23 (0.42)
Brazil Dummy	0.14 (0.34)	0.27 (0.44)	0.08 (0.26)	0.01 (0.12)
Access to health services	63.03 (24.07)	52.63 (22.68)	65.82 (23.42)	80.69 (15.62)
Health results	62.1 (11.35)	57.65 (11.42)	63.53 (10.66)	68.64 (9.13)
Children's height for age	43.1 (12.95)	39.07 (13.18)	44.32 (12.35)	49.38 (11.23)
Observations	26273	9095	14050	3128

Standard deviation in parenthesis

TABLE 2.1 DEFINITION AND DISTRIBUTION OF HOUSEHOLD EDUCATIONAL LEVELS

EDUCATIONAL LEVEL	EDUCATIONAL INDEX	PERCENT OF FULL SAMPLE	PERU	BOLIVIA	GUATEMALA	BRAZIL
VERY LOW	0 TO 30	34.7	26.7	28.4	68.8	40.0
LOW	30 TO 50	53.4	57.2	58.3	30.0	55.1
MEDIUM	50 TO 100	11.9	16.1	13.3	1.2	4.9

TABLE 2.2 DESCRIPTIVE STATISTICS FOR HOUSEHOLD EDUCATIONAL LEVELS

	SCHOOLING (YRS)		WOMEN'S DE FACTO LITERACY (%)		
EDUCATIONAL STATUS	WOMAN'S SCHOOLING	HUSBAND'S SCHOOLING	DOES NOT READ	READS WITH DIFFICULTY	READS FLUENTLY
VERY LOW	2.28	3.26	0.45	0.26	0.29
LOW	6.30	7.29	0.05	0.20	0.74
MEDIUM	11.79	12.98	0.01	0.03	0.97

Table 2.3 Population Distribution (%) by Geographic Regions and Educational Levels

Geographic Region	Sample restricted to education level			
	Any	Very Low	Low	Middle
Lima Metropolitana	12.61	2.66	15.17	24.98
Peru Resto Costa Urbano	8.36	3.2	9.45	15.73
Peru Resto Costa Rural	2.62	3.2	2.71	0.92
Peru Sierra Urbano	6.5	2.82	6.32	15.68
Peru Sierra Rural	13.36	20.07	11.59	5.23
Peru Amazonia Urbano	3.19	1.87	3.48	5.03
Peru Amazonia Rural	4.43	6.08	4.27	1.33
Bolivia Antiplano Urbano	5.04	1.8	6.09	8.2
Bolivia Antiplano Rural	3.4	3.97	3.69	0.93
Boliva Valle Urbano	3.02	1.19	3.16	6.62
Bolivia Valle Rural	3.19	5.44	2.58	0.53
Bolivia Llano Urbano	3.9	1.81	4.74	5.2
Bolivia Llano Rural	2.14	2.53	2.32	0.46
Guatemala Metropolitano Urbanc	2.98	3.01	3.3	1.62
Guatemala Metropolitano Rural	1.03	1.99	0.75	0
Guatemala Norte Urbano	0.12	0.16	0.11	0.11
Guatemala Norte Urbano	0.95	2.48	0.32	0
Guatemala Noreste Urbano	0.32	0.53	0.25	0.12
Guatemala Noreste Rural	0.92	2.42	0.31	0
Guatemala SuresteUrbano	0.32	0.61	0.24	0
Guatemala SuresteRural	0.93	1.85	0.64	0
Guatemala Central Urbano	0.49	0.76	0.41	0.17
Guatemala Central Rural	0.9	1.93	0.49	0.21
Guatemala Suroeste Urbano	0.58	0.76	0.56	0.27
Guatemala Suroeste Rural	2.26	5.21	1.14	0.11
Guatemala Noroeste Urbano	0.16	0.35	0.09	0
Guatemala Noroeste Rural	1.34	3.64	0.38	0
Guatemala Peten Urbano	0.08	0.11	0.07	0
Guatemala Peten Rural	0.38	0.99	0.13	0
Brasil Rio De Janeiro Urbano	1.13	0.55	1.48	1.02
Brasil Rio De Janeiro Rural	0.07	0.18	0.02	0
Brasil Sao Paulo Urbano	2.46	1.35	3.17	2.07
Brasil Sao Paulo Rural	0.3	0.24	0.4	0.06
Brasil Sul Capital Urbano	1.45	0.86	1.81	1.32
Brasil Sul Capital Rural	0.4	0.26	0.55	0.12
Brasil Centro Leste Urbano	1.48	1.29	1.78	0.71
Brasil Centro Leste Rural	0.33	0.6	0.26	0
Brasil Nordeste Urbano	3.05	4.34	2.9	0.72
Brasil Nordeste Rural	2.07	4.84	1.02	0
Brasil Norte Urbano	0.72	0.94	0.71	0.24
Brasil Norte Rural	0.06	0.14	0.03	0
Brasil Centro Oeste Urbano	0.75	0.69	0.89	0.3
Brasil Centro Oeste Rural	0.21	0.3	0.22	0
Total	100	100	100	100

Table 2.4 Correlation Matrix for ECD Indicators

	Vaccinations	Health Status	Height for Age z-Score
Vaccinations	1.0000	0.3987	0.3347
Health Status	0.3987	1.0000	0.6109
Height for Age z-Score	0.3347	0.6109	1.0000

Table 2.5 Correlation Matrix Between Individual and Local Variables

	Individual Variables							
Local Variables	Socio Economic Status	Basic Household Quality	Household Goods	Education	Mother's HAZ	Mother's Employment	Employment	Migration
Local (non-mean) variables								
Indigenous	-0.40	-0.36	-0.29	-0.30	-0.19	-0.02	-0.18	-0.15
Born in City	0.24	0.19	0.19	0.18	0.08	0.07	0.16	-0.03
Born in Town	0.07	0.06	0.04	0.02	0.03	0.02	0.02	0.15
Born in Countryside	-0.54	-0.43	-0.41	-0.41	-0.16	-0.17	-0.37	0.07
Live in Capital City	0.46	0.41	0.41	0.34	0.11	0.14	0.32	0.46
Live in Small City	0.34	0.26	0.21	0.15	0.10	0.05	0.14	0.13
Live in Town	0.30	0.18	0.07	0.03	0.05	-0.01	0.03	-0.05
Live in Countryside	-0.95	-0.65	-0.54	-0.42	-0.20	-0.15	-0.40	-0.46
Peru Dummy	0.06	-0.27	-0.02	0.21	-0.10	0.18	0.19	-0.02
Bolivia Dummy	0.06	0.04	0.00	0.07	0.03	0.02	0.02	0.03
Guatemala Dummy	-0.38	0.02	-0.14	-0.30	-0.21	-0.27	-0.31	-0.12
Brazil Dummy	0.22	0.32	0.16	-0.08	0.32	-0.02	0.02	0.11
Regional mean variables								
Socio Economic Status	0.65	0.57	0.47	0.23	0.20	0.43	0.45	0.45
Basic Household Quality	0.75	0.52	0.29	0.23	0.04	0.27	0.41	0.41
Household Goods	0.67	0.59	0.42	0.23	0.15	0.38	0.45	0.45
Education	0.41	0.46	0.53	0.14	0.25	0.46	0.37	0.37
Mother's Height for Age	0.41	0.32	0.18	0.41	0.11	0.22	0.24	0.24
Mother's Employment	0.10	0.26	0.41	0.14	0.33	0.42	0.23	0.23
Employment	0.41	0.46	0.50	0.19	0.29	0.49	0.39	0.39
Migration Variable	0.63	0.65	0.55	0.41	0.21	0.16	0.39	0.48

Table 3.1 Concentration Index

Variable	Sample restricted to education level			
	Any	Very Low	Low	Middle
Vaccinations	0.124	0.114	0.099	0.033
	(109.6)	(42.2)	(64.5)	(14.1)
Health Status	0.045	0.032	0.03	0.013
	(62.7)	(22.2)	(32.5)	(8)
Height for Age z-Score	0.06	0.042	0.043	0.02
	(48.3)	(15.4)	(27.9)	(7)

t-statistic in parenthesis

Table 4.1.1 Decomposition Regression for Access to Vaccinations

Variable	Regional Mean Variables Included in Local Variables Sample restricted to education level Any	Very Low	Low	Middle
Basic household quality	0.203 (0)***	0.219 (0)***	0.186 (0)***	0.063 (0.017)**
Household goods	0.082 (0)***	0.074 (0)***	0.082 (0)***	0.088 (0.01)**
Education	0.141 (0)***	0.326 (0)***	0.128 (0.062)*	0.041 (0.274)
Mother's height for age	-0.024 (0.469)	-0.066 (0.209)	-0.014 (0.694)	0.055 (0.407)
Mother's employment	-0.133 (0)***	-0.146 (0)***	-0.183 (0)***	-0.093 (0.008)***
Employment	0.28 (0)***	0.313 (0)***	0.372 (0)***	0.199 (0.004)***
Indigenous	-4.13 (0.032)**	-3.524 (0.1)	-3.12 (0.059)*	-15.628 (0)***
Children's age	-0.1 (0.354)	0.126 (0.39)	-0.152 (0.287)	-0.482 (0.019)**
Mother's age	-0.342 (0.017)**	-0.325 (0.246)	-0.062 (0.674)	0.164 (0.626)
Number of children	-1.828 (0)***	-0.895 (0.193)	-2.355 (0)***	-2.409 (0.001)***
Born in City	-1.855 (0.099)*	-3.71 (0.134)	-0.3 (0.789)	-2.742 (0.056)*
Born in Town	-4.228 (0.005)***	-5.382 (0.075)*	-1.401 (0.306)	-7.196 (0)***
Born in Countryside	-7.432 (0)***	-8.086 (0.012)**	-4.158 (0.01)**	-14.122 (0)***
Migration Variable	0.984 (0.273)***	2.251 (0.105)	-0.642 (0.457)***	2.87 (0.005)
Local (non-mean) variables				
Live in Small City	-0.654 (0.668)	1.409 (0.478)	-2.307 (0.233)	0.213 (0.844)
Live in Town	-0.871 (0.626)	2.493 (0.372)	-3.751 (0.027)**	0.882 (0.572)
Live in Countryside	16.478 (0)***	15.369 (0.004)***	19.698 (0)***	2.619 (0.793)
Bolivia Dummy	-8.462 (0)***	-0.95 (0.815)	-7.209 (0.001)***	3.186 (0.249)
Guatemala Dummy	-18.464 (0)***	8.541 (0.167)	-11.416 (0.002)***	2.82 (0.484)
Brazil Dummy	-20.935 (0)***	5.836 (0.458)	-13.969 (0.004)***	0.695 (0.885)
Regional mean variables				
Basic household quality	0.56 (0)***	0.007 (0.966)	0.348 (0.001)***	0.03 (0.954)
Household goods	0.133 (0.148)	0.135 (0.218)	0.067 (0.529)	0.252 (0.479)
Education	-1.453 (0)***	-0.557 (0.354)	-4.476 (0.012)**	-0.17 (0.753)
Mother's height for age	2.383 (0)***	2.603 (0.003)***	1.702 (0.001)***	0.614 (0.372)
Mother's employment	-0.353 (0.134)	-0.338 (0.226)	-1.331 (0.003)***	0.252 (0.454)
Employment	0.186 (0.622)	0.47 (0.366)	1.719 (0.035)**	-0.841 (0.302)
Migration Variable	19.189 (0)***	11.019 (0.018)***	22.786 (0)***	1.872 (0.606)***
Constant	-70.6 (0.003)	-105.43 (0.006)	82.675 (0.199)	50.515 (0.154)
R squared	0.549	0.476	0.496	0.338
F	2139	356	556	2135
Prob>F	0	0	0	0
Observations	26273	9095	14050	3128

p values in parenthesis; significance: * 0.1, ** 0.05, *** 0.01

Table 4.1.2 Decomposition Regression for Health Results

Regional Mean Variables Included in Local Variables

Variable	**Sample restricted to education level**			
	Any	**Very Low**	**Low**	**Middle**
Basic household quality	0.064	0.061	0.061	0.054
	(0)***	(0)***	(0)***	(0.009)***
Household goods	0.039	0.032	0.038	0.037
	(0)***	(0.001)***	(0)***	(0.004)***
Education	0.076	0.119	0.062	-0.005
	(0)***	(0)***	(0.178)	(0.847)
Mother's height for age	0.374	0.419	0.36	0.3
	(0)***	(0)***	(0)***	(0)***
Mother's employment	-0.038	-0.041	-0.055	-0.065
	(0.001)***	(0.099)*	(0)***	(0)***
Employment	0.075	0.095	0.108	0.116
	(0)***	(0.019)**	(0)***	(0)***
Indigenous	-1.508	-1.833	-0.824	-3.812
	(0)***	(0.007)***	(0.07)*	(0.004)***
Children's age	0.335	0.233	0.345	0.467
	(0)***	(0.006)***	(0)***	(0.01)**
Mother's age	-0.404	-0.633	-0.203	0.277
	(0.001)***	(0.002)***	(0.028)**	(0.123)
Number of children	-0.54	-0.851	-0.389	-0.113
	(0.001)***	(0)***	(0.086)*	(0.75)
Born in City	-0.395	-2.358	0.349	-1.089
	(0.14)	(0.059)*	(0.421)	(0.187)
Born in Town	-1.074	-2.088	-0.317	-2.489
	(0.005)***	(0.064)*	(0.48)	(0.016)**
Born in Countryside	-1.738	-3.068	-0.419	-2.557
	(0)***	(0.017)**	(0.504)	(0.068)*
Migration Variable	0.494	0.48	0.084	1.161
	(0.033)***	(0.275)	(0.76)*	(0.039)
Local (non-mean) variables				
Live in Small City	-0.465	0.431	-0.912	0.403
	(0.347)	(0.597)	(0.14)	(0.644)
Live in Town	1.116	2.237	0.312	2.072
	(0.052)*	(0.032)**	(0.648)	(0.005)***
Live in Countryside	5.147	2.84	7.746	4.287
	(0.006)***	(0.08)*	(0)***	(0.237)
Bolivia Dummy	-2.637	0.217	-1.461	-1.316
	(0.001)***	(0.752)	(0.066)*	(0.193)
Guatemala Dummy	-5.18	1.677	-2.878	1.248
	(0.005)***	(0.18)	(0.044)**	(0.562)
Brazil Dummy	-5.006	2.001	-0.7	-1.294
	(0.017)**	(0.287)	(0.684)	(0.603)
Regional mean variables				
Basic household quality	0.015	-0.094	-0.046	-0.019
	(0.708)	(0.024)**	(0.213)	(0.916)
Household goods	0.117	0.098	0.041	0.092
	(0.002)***	(0)***	(0.195)	(0.359)
Education	-0.234	0.276	-0.193	-0.273
	(0.092)*	(0.055)*	(0.755)	(0.218)
Mother's height for age	0.523	0.182	0.287	0.442
	(0.001)***	(0.337)	(0.06)*	(0.205)
Mother's employment	-0.126	-0.072	-0.414	0.044
	(0.164)	(0.183)	(0.01)**	(0.724)
Employment	0.053	0.029	0.551	-0.256
	(0.716)	(0.767)	(0.04)**	(0.409)
Migration Variable	3.843	0.791	6.38	2.683
	(0.059)***	(0.372)***	(0.001)***	(0.236)***
Constant	9.083	17.932	21.799	38.044
	(0.2)	(0.045)	(0.305)	(0.061)
R squared	0.283	0.196	0.22	0.162
F	276	275	330	1369
Prob>F	0	0	0	0
Observations	26273	9095	14050	3128

p values in parenthesis; significance: * 0.1, ** 0.05, *** 0.01

Table 4.1.3 Decomposition Regression for Children's Height for Age

Variable	Regional Mean Variables Included in Local Variables			
	Sample restricted to education level			
	Any	Very Low	Low	Middle
Basic household quality	0.042 (0.001)***	0.017 (0.285)	0.055 (0)***	0.026 (0.178)
Household goods	0.036 (0)***	0.034 (0)***	0.033 (0)***	0.024 (0.256)
Education	0.04 (0.002)***	0.083 (0.002)***	0.06 (0.015)**	-0.027 (0.47)
Mother's height for age	0.538 (0)***	0.547 (0)***	0.538 (0)***	0.489 (0)***
Mother's employment	-0.048 (0)***	-0.076 (0.001)***	-0.045 (0)***	-0.053 (0)***
Employment	0.093 (0)***	0.144 (0)***	0.091 (0)***	0.123 (0)***
Indigenous	-1.365 (0.003)***	-1.802 (0.001)***	-0.779 (0.154)	-3.856 (0.001)***
Children's age	-1.322 (0)***	-1.821 (0)***	-1.216 (0)***	-0.616 (0.022)**
Mother's age	-0.016 (0.814)	-0.054 (0.593)	0.03 (0.794)	0.388 (0.012)**
Number of children	-0.841 (0)***	-0.863 (0.01)**	-0.849 (0)***	-0.44 (0.361)
Born in City	-0.14 (0.614)	-1.229 (0.299)	0.223 (0.63)	0.044 (0.939)
Born in Town	-0.377 (0.347)	-1.294 (0.297)	0.249 (0.613)	-0.412 (0.734)
Born in Countryside	-0.642 (0.191)	-2.592 (0.06)*	0.639 (0.3)	0.37 (0.738)
Migration Variable	0.25 (0.15)***	0.977 (0.104)**	-0.186 (0.406)	0.1 (0.87)
Local (non-mean) variables				
Live in Small City	-0.53 (0.245)	0.814 (0.434)	-1.017 (0.073)*	-0.453 (0.589)
Live in Town	0.088 (0.841)	1.146 (0.324)	-0.374 (0.42)	0.176 (0.845)
Live in Countryside	4.651 (0.001)***	3.699 (0.051)*	5.861 (0)***	3.245 (0.281)
Bolivia Dummy	-2.01 (0.002)***	1.788 (0.01)**	-1.102 (0.129)	-1.271 (0.105)
Guatemala Dummy	-6.232 (0)***	0.95 (0.502)	-4.174 (0)***	-2.418 (0.269)
Brazil Dummy	-3.658 (0.038)**	5.632 (0.007)***	-1.34 (0.39)	-2.323 (0.383)
Regional mean variables				
Basic household quality	0.01 (0.806)	-0.146 (0.002)***	-0.057 (0.179)	0.191 (0.273)
Household goods	0.078 (0.019)**	0.075 (0.007)***	0.067 (0.046)**	-0.072 (0.537)
Education	-0.162 (0.147)	0.329 (0.045)**	-0.408 (0.495)	-0.401 (0.114)
Mother's height for age	0.655 (0)***	0.29 (0.13)	0.464 (0.001)***	0.632 (0.086)*
Mother's employment	-0.082 (0.201)	-0.108 (0.09)*	-0.326 (0.037)**	-0.076 (0.532)
Employment	-0.002 (0.982)	0.116 (0.374)	0.434 (0.084)*	-0.154 (0.574)
Migration Variable	5.524 (0.001)***	2.666 (0.008)***	6.393 (0)***	4.651 (0.009)***
Constant	-21.657 (0.001)	-7.886 (0.361)	-4.879 (0.819)	8.255 (0.653)
R squared	0.276	0.235	0.239	0.152
F	593	230	627	6688
Prob>F	0	0	0	0
Observations	26273	9095	14050	3128

p values in parenthesis; significance: * 0.1, ** 0.05, *** 0.01

Table 4.2.1 Decomposition Regression for Access to Vaccinations

Variable	Regional Mean Variables Included in Local Variables Sample restricted to education level Any	Very Low	Low	Middle
Basic household quality	0.238 (0)***	0.226 (0)***	0.23 (0)***	0.065 (0.018)**
Household goods	0.091 (0)***	0.084 (0)***	0.095 (0)***	0.113 (0.006)***
Education	0.127 (0)***	0.339 (0)***	0.12 (0.071)*	0.02 (0.656)
Mother's height for age	0.02 (0.591)	-0.013 (0.773)	0.039 (0.378)	0.096 (0.18)
Mother's employment	-0.131 (0)***	-0.151 (0)***	-0.176 (0)***	-0.089 (0.008)***
Employment	0.254 (0)***	0.318 (0)***	0.335 (0)***	0.179 (0.006)***
Indigenous	-6.212 (0.006)***	-4.377 (0.05)*	-6.817 (0.006)***	-17.022 (0)***
Children's age	-0.078 (0.481)	0.122 (0.424)	-0.143 (0.34)	-0.449 (0.024)**
Mother's age	-0.337 (0.02)**	-0.332 (0.23)	-0.089 (0.559)	0.195 (0.545)
Number of children	-1.78 (0)***	-0.846 (0.255)	-2.372 (0)***	-2.372 (0.002)***
Born in City	-1.049 (0.426)	-4.674 (0.017)**	0.226 (0.874)	-1.98 (0.141)
Born in Town	-3.99 (0.022)**	-6.535 (0.018)**	-1.854 (0.271)	-6.091 (0.001)***
Born in Countryside	-7.08 (0)***	-9.29 (0.002)***	-4.376 (0.015)**	-12.711 (0)***
Migration Variable	0.95 (0.328)	2.89 (0.071)	-0.373 (0.677)	2.393 (0.021)
Local (non-mean) variables				
Live in Small City	-3.624 (0.108)	-0.003 (0.999)	-5.024 (0.056)*	-1.252 (0.214)
Live in Town	-4.325 (0.073)*	-0.089 (0.979)	-6.362 (0.008)***	-1.607 (0.37)
Live in Countryside	-6.193 (0.049)**	-1.086 (0.78)	-8.231 (0.018)**	-4.288 (0.097)*
Bolivia Dummy	0.326 (0.899)	2.229 (0.405)	0.08 (0.979)	0.384 (0.794)
Guatemala Dummy	5.588 (0.005)***	7.888 (0)***	6.085 (0.004)***	2.797 (0.113)
Brazil Dummy	14.704 (0)***	20.61 (0)***	13.301 (0)***	5.303 (0)***
Constant	46.086 (0)	35.661 (0)	46.001 (0)	61.845 (0)
R squared	0.524	0.462	0.464	0.319
F	520	170	353	463
Prob>F	0	0	0	0
Observations	26273	9095	14050	3128

p values in parenthesis; significance: * 0.1, ** 0.05, *** 0.01

Table 4.2.2 Decomposition Regression for Health Results

Regional Mean Variables Included in Local Variables

Variable	Sample restricted to education level			
	Any	**Very Low**	**Low**	**Middle**
Basic household quality	0.066 (0)***	0.058 (0)***	0.066 (0)***	0.053 (0.007)***
Household goods	0.046 (0)***	0.04 (0)***	0.044 (0)***	0.051 (0.002)***
Education	0.075 (0)***	0.135 (0)***	0.067 (0.128)	-0.019 (0.526)
Mother's height for age	0.388 (0)***	0.43 (0)***	0.373 (0)***	0.325 (0)***
Mother's employment	-0.037 (0.001)***	-0.045 (0.066)*	-0.057 (0)***	-0.064 (0)***
Employment	0.067 (0.001)***	0.097 (0.016)**	0.105 (0)***	0.107 (0)***
Indigenous	-1.883 (0)***	-1.952 (0.003)***	-1.484 (0.005)***	-4.46 (0.003)***
Children's age	0.338 (0)***	0.239 (0.006)***	0.341 (0)***	0.476 (0.008)***
Mother's age	-0.403 (0.001)***	-0.64 (0.002)***	-0.192 (0.042)**	0.308 (0.059)*
Number of children	-0.553 (0.001)***	-0.862 (0)***	-0.421 (0.08)*	-0.088 (0.787)
Born in City	-0.167 (0.579)	-2.209 (0.068)*	0.367 (0.449)	-0.715 (0.37)
Born in Town	-1.008 (0.018)**	-1.978 (0.078)*	-0.556 (0.242)	-1.958 (0.064)*
Born in Countryside	-1.661 (0.003)***	-2.993 (0.018)**	-0.663 (0.307)	-1.857 (0.21)
Migration Variable	0.477 (0.06)**	0.375 (0.389)	0.205 (0.462)**	0.95 (0.105)***
Local (non-mean) variables				
Live in Small City	-1.097 (0.073)*	0.046 (0.957)	-1.566 (0.021)**	-0.542 (0.563)
Live in Town	0.179 (0.82)	1.567 (0.14)	-0.496 (0.546)	0.632 (0.571)
Live in Countryside	0.463 (0.643)	1.55 (0.284)	-0.12 (0.913)	1.604 (0.052)*
Bolivia Dummy	-1.494 (0.039)**	-0.219 (0.482)	-1.626 (0.042)**	-2.758 (0.006)***
Guatemala Dummy	-1.634 (0.004)***	-0.336 (0.556)	-1.831 (0.009)***	0.813 (0.624)
Brazil Dummy	1.125 (0.111)	0.863 (0.279)	1.573 (0.039)**	1.476 (0.154)
Constant	34.216 (0)	31.757 (0)	34.628 (0)	39.692 (0)
R squared	0.276	0.191	0.209	0.145
F	294	74	789	446
Prob>F	0	0	0	0
Observations	26273	9095	14050	3128

p values in parenthesis; significance: * 0.1, ** 0.05, *** 0.01

Table 4.2.3 Decomposition Regression for Children's Height for Age

Variable	Regional Mean Variables Included in Local Variables			
	Sample restricted to education level			
	Any	Very Low	Low	Middle
Basic household quality	0.043	0.01	0.058	0.025
	(0.001)***	(0.464)	(0)***	(0.173)
Household goods	0.042	0.041	0.039	0.036
	(0)***	(0)***	(0)***	(0.099)*
Education	0.04	0.097	0.063	-0.041
	(0.004)***	(0)***	(0.009)***	(0.288)
Mother's height for age	0.557	0.562	0.555	0.517
	(0)***	(0)***	(0)***	(0)***
Mother's employment	-0.046	-0.079	-0.045	-0.053
	(0)***	(0)***	(0)***	(0)***
Employment	0.084	0.147	0.086	0.116
	(0)***	(0)***	(0)***	(0)***
Indigenous	-1.763	-1.911	-1.401	-4.554
	(0)***	(0.001)***	(0.023)**	(0)***
Children's age	-1.32	-1.82	-1.216	-0.614
	(0)***	(0)***	(0)***	(0.022)**
Mother's age	-0.019	-0.064	0.037	0.427
	(0.795)	(0.521)	(0.752)	(0.002)***
Number of children	-0.853	-0.872	-0.879	-0.4
	(0)***	(0.009)***	(0)***	(0.392)
Born in City	0.032	-1.404	0.285	0.413
	(0.936)	(0.211)	(0.615)	(0.535)
Born in Town	-0.327	-1.424	0.064	0.114
	(0.509)	(0.244)	(0.906)	(0.927)
Born in Countryside	-0.623	-2.76	0.434	1.095
	(0.271)	(0.042)**	(0.506)	(0.359)
Migration Variable	0.277	1.002	-0.068	-0.094
	(0.18)	(0.08)***	(0.783)	(0.883)**
Local (non-mean) variables				
Live in Small City	-1.094	0.633	-1.595	-1.555
	(0.061)*	(0.517)	(0.012)**	(0.114)
Live in Town	-0.78	0.513	-1.089	-1.435
	(0.259)	(0.661)	(0.104)	(0.236)
Live in Countryside	-0.547	1.625	-1.012	-2.359
	(0.562)	(0.332)	(0.324)	(0.012)**
Bolivia Dummy	-0.761	0.941	-0.945	-2.385
	(0.328)	(0.001)***	(0.27)	(0.048)**
Guatemala Dummy	-3.834	-2.98	-3.345	-1.994
	(0)***	(0)***	(0)***	(0.326)
Brazil Dummy	2.297	3.245	2.318	1.721
	(0)***	(0)***	(0.001)***	(0.137)
Constant	11.817	12.032	9.94	15.795
	(0)	(0)	(0)	(0)
R squared	0.27	0.231	0.231	0.139
F	340	76	572	323
Prob>F	0	0	0	0
Observations	26273	9095	14050	3128

p values in parenthesis; significance: * 0.1, ** 0.05, *** 0.01

Table 5.1.1 Concentration Index Decomposition for Access to Vaccinations: Percent Contribution

Variable	Sample restricted to education level			
	Any	Very Low	Low	Middle
Individual Variables				
Basic household quality	25.9***	33.4***	27***	12**
Household goods	11.3***	9.4***	12.2***	18.5**
Education	10.5***	8.6***	2.4*	4.8
Mother's height for age	-0.3	-0.8	-0.1	1.4
Mother's employment	-15.5***	-25.6***	-23.8***	-33.7***
Employment	30.2***	32.5***	37.2***	48.6***
Indigenous	3.8**	2.9	2.3*	8.4***
Children's age	0	0.1	-0.1	0.1**
Mother's age	-0.1**	0.4	-0.1	0.8
Number of children	2.5***	1	3.9***	4.1***
Born in City	-1*	-1.3	-0.1	0.1*
Born in Town	-0.5***	-3.6*	-0.1	4.3***
Born in Countryside	13.5***	12.8**	6.4**	15.9***
Migration Variable	1.1***	4.8	-0.8***	-0.7
Local (non-mean) variables				
Live in Small City	-0.3	0.9	-1.2	0.1
Live in Town	-0.1	1	-0.4**	-0.1
Live in Countryside	-35.7***	-32.8***	-42.6***	-5.1
Bolivia Dummy	-0.7***	-0.1	0.9***	3.2
Guatemala Dummy	8.8***	-5.2	-0.5***	0.6
Brazil Dummy	-6.6***	6.1	-10.3***	0.6
Residual	0.6	0.5	-0.3	2.3
Regional mean variables				
Basic household quality	40.5***	0.5	27.9***	2
Household goods	9.4	7.6	4.6	15.9
Education	-43.1***	-4.6	-23.6**	-2
Mother's height for age	14.6***	23.2***	9.1***	5.9
Mother's employment	-8.6	-7.4	-8.5***	0.9
Employment	7.1	11.9	38.3**	-10.7
Migration	32.6***	23.7***	40.3***	1.9***
Mean Residual	0	0	0	0
Total Individual	81.4	74.6	66.3	84.6
Individual Residual	0.6	0.5	-0.3	2.3
Total Local	17.9	24.8	34	13.2
Local Residual	0	0	0	0
Total Individual plus Local	99.9	99.9	100	100.1
Total Absolute Individual	116.2	137.2	116.5	153.4
Total Absolute Local	208.1	125	208.2	49

Significance: * 0.1, ** 0.05, *** 0.01

Table 5.1.2 Concentration Index Decomposition for Health Results: Percent Contribution

Variable	Sample restricted to education level			
	Any	Very Low	Low	Middle
Individual Variables				
Basic household quality	23.8***	30.3***	31.4***	31.5***
Household goods	15.6***	13***	19.9***	24.1***
Education	16.6***	10.3***	4.2	-2
Mother's height for age	13.2***	17***	12.3***	23.3***
Mother's employment	-12.7***	-23.6*	-25.3***	-73.3***
Employment	23.6***	32.2**	38.2***	87.2***
Indigenous	4.1***	5***	2.1*	6.3***
Children's age	0.4***	0.4***	0.8***	-0.4**
Mother's age	-0.3***	2.3***	-0.8**	4.2
Number of children	2.1***	3***	2.3*	0.6
Born in City	-0.6	-2.6*	0.6	0.1
Born in Town	-0.4***	-4.6*	-0.1	4.6**
Born in Countryside	9.2***	15.9**	2.3	8.9*
Migration Variable	1.7***	3.4	0.4*	-0.9
Local (non-mean) variables				
Live in Small City	-0.6	0.9	-1.7	0.4
Live in Town	0.3*	3**	0.1	-0.9***
Live in Countryside	-32.5***	-19.9*	-59.2***	-25.7
Bolivia Dummy	-0.6***	0	0.6*	-4.1
Guatemala Dummy	7.2***	-3.4	-0.5**	0.8
Brazil Dummy	-4.6**	6.9	-1.8	-3.3
Residual	2	0.9	1.5	2.5
Regional mean variables				
Basic household quality	3.1	-24.2**	-13.1	-3.9
Household goods	24.1***	18.1***	10.1	18
Education	-20.2*	7.5*	-3.6	-10
Mother's height for age	9.3***	5.3	5.4*	13.2
Mother's employment	-8.9	-5.1	-9.3**	0.5
Employment	5.9	2.4	43.3**	-10
Migration	19***	5.6***	39.8***	8.5***
Mean Residual	0	0	0	0
Total Individual	96.3	102	88.3	114.2
Individual Residual	2	0.9	1.5	2.5
Total Local	1.5	-2.9	10.1	-16.5
Local Residual	0	0	0	0
Total Individual plus Local	99.8	100	99.9	100.2
Total Absolute Individual	124.3	163.6	140.7	267.4
Total Absolute Local	136.3	102.3	188.5	99.3

Significance: * 0.1, ** 0.05, *** 0.01

Table 5.1.3 Concentration Index Decomposition for Children's Height for Age: Percent Contribution

Variable	Sample restricted to education level			
	Any	**Very Low**	**Low**	**Middle**
Individual Variables				
Basic household quality	16.6***	9.5	28.6***	13.3
Household goods	15.3***	16.3***	17.4***	14
Education	9.3***	8.3***	4.1**	-8.7
Mother's height for age	20.1***	25.5***	18.6***	33.8***
Mother's employment	-17.1***	-50***	-20.7***	-52.8***
Employment	31.2***	56.3***	32.4***	83.1***
Indigenous	3.9***	5.6***	2	5.7***
Children's age	-1.8***	-4***	-3***	0.4**
Mother's age	0	0.2	0.1	5.2**
Number of children	3.5***	3.5**	5***	2.1
Born in City	-0.2	-1.6	0.4	0
Born in Town	-0.1	-3.3	0	0.7
Born in Countryside	3.6	15.4*	-3.5	-1.1
Migration Variable	0.9***	7.9**	-0.8	-0.1
Local (non-mean) variables				
Live in Small City	-0.7	2	-1.9*	-0.4
Live in Town	0	1.7	-0.1	-0.1
Live in Countryside	-31.1***	-29.7*	-45.1***	-17.4
Bolivia Dummy	-0.5***	0.4**	0.5	-3.5
Guatemala Dummy	9.2***	-2.2	-0.7***	-1.4
Brazil Dummy	-3.6**	22.1***	-3.5	-5.3
Residual	2.1	-0.3	1.7	-1
Regional mean variables				
Basic household quality	2.2	-43.3***	-16.3	35.4
Household goods	17.2**	15.8***	16.6**	-12.6
Education	-14.8	10.2**	-7.7	-13.1
Mother's height for age	12.4***	9.7	8.8***	16.8*
Mother's employment	-6.2	-8.8*	-7.4**	-0.7
Employment	-0.3	11.1	34.4*	-5.4
Migration	29***	21.6***	40.2***	13.1***
Mean Residual	0	0	0	0
Total Individual	85.2	89.6	80.6	95.6
Individual Residual	2.1	-0.3	1.7	-1
Total Local	12.8	10.6	17.8	5.4
Local Residual	0	0	0	0
Total Individual plus Local	100.1	99.9	100.1	100
Total Absolute Individual	123.6	207.4	136.6	221
Total Absolute Local	127.2	178.6	183.2	125.2

Significance: * 0.1, ** 0.05, *** 0.01

Table 5.2.1 Concentration Index Decomposition for Access to Vaccinations: Percent Contribution

Variable	Sample restricted to education level			
	Any	**Very Low**	**Low**	**Middle**
Individual Variables				
Basic household quality	30.5***	34.5***	33.4***	12.2**
Household goods	12.5***	10.6***	14.1***	23.8***
Education	9.5***	9***	2.3*	2.3
Mother's height for age	0.2	-0.2	0.4	2.4
Mother's employment	-15.2***	-26.3***	-22.9***	-32.1***
Employment	27.5***	33***	33.5***	43.7***
Indigenous	5.7***	3.6*	5***	9.2***
Children's age	0	0.1	-0.1	0.1**
Mother's age	-0.1**	0.4	-0.1	1
Number of children	2.4***	0.9	3.9***	4***
Born in City	-0.6	-1.6**	0.1	0.1
Born in Town	-0.5**	-4.4**	-0.1	3.6***
Born in Countryside	12.9***	14.7***	6.8**	14.3***
Migration Variable	1.1	6.2	-0.5	-0.6
Local (non-mean) variables				
Live in Small City	-1.5	0	-2.7*	-0.4
Live in Town	-0.4*	0	-0.6***	0.2
Live in Countryside	13.4**	2.3	17.8**	8.3*
Bolivia Dummy	0	0.1	0	0.4
Guatemala Dummy	-2.7***	-4.8***	0.3***	0.6
Brazil Dummy	4.6***	21.5***	9.8***	4.4***
Residual	0.6	0.5	-0.4	2.6
Total Individual	84.8	74.3	76.3	84.6
Total Local	13.4	19.1	24.6	13.5
Individual Residual	0.6	0.5	-0.4	2.6
Total Individual plus Local	98.8	93.9	100.5	100.7
Total Absolute Individual	118.7	145.5	123.2	149.4
Total Absolute Local	22.6	28.7	31.2	14.3

Significance: * 0.1, ** 0.05, *** 0.01

Table 5.2.2 Concentration Index Decomposition for Health Results: Percent Contribution

Variable	Sample restricted to education level: Any	Very Low	Low	Middle
Individual Variables				
Basic household quality	24.8***	28.8***	33.6***	30.7***
Household goods	18.4***	16.5***	22.7***	32.7***
Education	16.3***	11.7***	4.6	-6.9
Mother's height for age	13.7***	17.4***	12.8***	25.2***
Mother's employment	-12.6***	-25.5*	-26***	-71.9***
Employment	21.2***	33.1**	37.1***	80.5***
Indigenous	5.1***	5.3***	3.8***	7.4***
Children's age	0.4***	0.5***	0.8***	-0.4***
Mother's age	-0.3***	2.3***	-0.8**	4.7*
Number of children	2.2***	3***	2.4*	0.5
Born in City	-0.3	-2.4*	0.6	0.1
Born in Town	-0.4**	-4.4*	-0.1	3.6*
Born in Countryside	8.8***	15.5**	3.6	6.5
Migration Variable	1.6**	2.6	0.9**	-0.8***
Local (non-mean) variables				
Live in Small City	-1.3*	0.1	-3**	-0.6
Live in Town	0.1	2.1	-0.2	-0.3
Live in Countryside	-2.9	-10.8	0.9	-9.6*
Bolivia Dummy	-0.3**	0	0.7**	-8.6***
Guatemala Dummy	2.3***	0.7	-0.3***	0.5
Brazil Dummy	1	3	4.1**	3.7
Residual	2.2	0.7	1.6	2.9
Total Individual	97.3	101.8	95.1	112.7
Total Local	-1.1	-4.9	2.2	-14.9
Individual Residual	2.2	0.7	1.6	2.9
Total Individual plus Local	98.4	97.6	98.9	100.7
Total Absolute Individual	126.1	169	149.8	271.9
Total Absolute Local	7.9	16.7	9.2	23.3

Significance: * 0.1, ** 0.05, *** 0.01

Table 5.2.3 Concentration Index Decomposition for Children's Height for Age: Percent Contribution

Variable	Sample restricted to education level			
	Any	Very Low	Low	Middle
Individual Variables				
Basic household quality	17***	5.7	29.9***	12.9
Household goods	18***	19.5***	20.8***	21*
Education	9.3***	9.7***	4.3***	-13.2
Mother's height for age	20.8***	26.1***	19.2***	35.8***
Mother's employment	-16.3***	-51.9***	-20.9***	-52.6***
Employment	28.1***	57.3***	30.6***	77.7***
Indigenous	5***	6***	3.6**	6.7***
Children's age	-1.8***	-4***	-3***	0.4**
Mother's age	0	0.3	0.2	5.8***
Number of children	3.6***	3.5***	5.2***	1.9
Born in City	0.1	-1.8	0.5	0
Born in Town	-0.1	-3.6	0	-0.2
Born in Countryside	3.5	16.4**	-2.4	-3.4
Migration Variable	1	8***	-0.3	0.1**
Local (non-mean) variables				
Live in Small City	-1.4*	1.5	-3**	-1.4
Live in Town	-0.2	0.8	-0.4	0.6
Live in Countryside	3.7	-13	7.8	12.6**
Bolivia Dummy	-0.2	0.2***	0.4	-6.6**
Guatemala Dummy	5.6***	6.8***	-0.5***	-1.1
Brazil Dummy	2.2***	12.8***	6.1***	3.9
Residual	2.3	-0.4	2	-0.7
Total Individual	87.2	83.2	88	92.8
Total Local	9.7	9.1	10.4	8
Individual Residual	2.3	-0.4	2	-0.7
Total Individual plus Local	99.2	91.9	100.4	100.1
Total Absolute Individual	124.6	213.8	140.9	231.7
Total Absolute Local	13.3	35.1	18.2	26.2

Significance: * 0.1, ** 0.05, *** 0.01

TABLE 6.1. POPULATION COMPOSITION IN EACH TYPE OF PLACE OF RESIDENCE ACCORDING TO PLACE OF BIRTH

PLACE OF RESIDENCE	CHILDHOOD PLACE OF RESIDENCE				CURRENT PROPORTION OF TOTAL
	CAPITAL	CITY	TOWN	COUNTRY-SIDE	
CAPITAL, LARGE CITY	48.98	19.36	20.48	11.18	42.36
SMALL CITY	22.96	43.36	17.95	15.73	7.76
TOWN	8.16	34.45	34.24	23.16	9.72
COUNTRYSIDE	4.49	3.92	24.81	66.79	40.15
CHILDHOOD PROPORTION OF TOTAL	25.12	16.49	23.36	35.03	100.00

Table 6.2 Migration and Human Capital Formation (Robust clustering by regions)

	Household Education	Children's Access to Vaccina-	Children's Health Status	Children's Height for Age z-Score
Migration Variable	0.049***	0.779	0.802**	0.873***
	(0.008)	(0.576)	(0.017)	(0.005)
Born in City	-0.089***	-0.548	-0.294	-0.275
	(0.001)	(0.717)	(0.515)	(0.624)
Born in Town	-0.323***	-5.497**	-2.363***	-2.089**
	(0)	(0.023)	(0.001)	(0.012)
Born in Countryside	-0.545***	-11.381***	-4.69***	-4.337***
	(0)	(0.001)	(0)	(0)
Live in Small City	-0.05	-2.555	-0.407	-0.345
	(0.222)	(0.139)	(0.559)	(0.685)
Live in Town	-0.096*	-5.258*	-0.371	-0.688
	(0.085)	(0.054)	(0.659)	(0.437)
Live in Countryside	-0.239***	-20.456***	-4.211***	-4.259***
	(0)	(0)	(0.001)	(0)
Children’s age	0.006**	0.017	0.304***	-1.453***
	(0.038)	(0.891)	(0)	(0)
Mother’s age	-0.01	-0.773***	-0.697***	-0.141
	(0.427)	(0.002)	(0)	(0.127)
Number of children	-0.055***	-4.045***	-1.589***	-1.922***
	(0)	(0)	(0)	(0)
Constant	2.325***	88.991***	70.74***	54.481***
	(0)	(0)	(0)	(0)

Significance: * 0.1, ** 0.05, *** 0.01

Table 7.1 Convergence Regressions for Intergenerational Change in Female HAZ (ΔHAZ)

Independent Variables:	1 ΔHAZ	2 ΔHAZ	3 ΔHAZ	4 Mean Regional Economic Comp. of ΔHAZ	5 Mean Regional Economic Comp. of ΔHAZ
Mother's height for age z-score	-0.447 0***	-0.645 0***		0.187 0.047**	-0.021 0.003**
Basic household quality		0.005 0***	0.006 0***		0.001 0.009**
Household goods		0.004 0***	0.005 0***		0 0.278
Education		0.005 0.01**	0.008 0***		0 0.644
Mother's employment		-0.005 0.001***	-0.007 0***		0 0.542
Employment		0.01 0***	0.014 0***		-0.001 0.283
Indigenous		-0.165 0.001***	-0.214 0.001***		-0.041 0.168
Children's age		-0.189 0***	-0.188 0***		0.002 0.033**
Mother's age		0.005 0.486	-0.002 0.764		0 0.916
Number of children		-0.102 0***	-0.117 0***		-0.006 0.119
Born in City		0.002 0.978	0.005 0.933		0.038 0.022**
Born in Town		-0.089 0.199	-0.13 0.043**		0 0.982
Born in Countryside		-0.186 0.002**	-0.22 0***		0.018 0.464
Live in Small City		-0.038 0.682	0.004 0.964		-0.125 0.101
Live in Town		0.04 0.627	0.089 0.288		-0.159 0.064*
Live in Country side		0.073 0.412	0.169 0.106		-0.431 0***
Migration Variable		0.064 0.01**	0.075 0.003**		-0.007 0.623
Bolivia Dummy		-0.083 0.373	-0.03 0.8		-0.168 0.016**
Guatemala Dummy		-0.408 0***	-0.521 0***		-0.206 0.016**
Brazil Dummy		0.337 0***	0.621 0***		-0.09 0.305
Constant	-0.161 0.171	-0.643 0***	-1.574 0***	1.068 0***	0.909 0***
Observations	13024	13024	13024	13024	13024
R squared	0.0935	0.231	0.2221	0.0673	0.65
F	199.32	509.29	315.54	4.18	17.28
Prob>F	0	0	0	0.0472	0

Figure 1 Intergenerational Phase Diagram for Female HAZ Dynamics

1.1 Level as function of level — 1.2 Difference as function of level

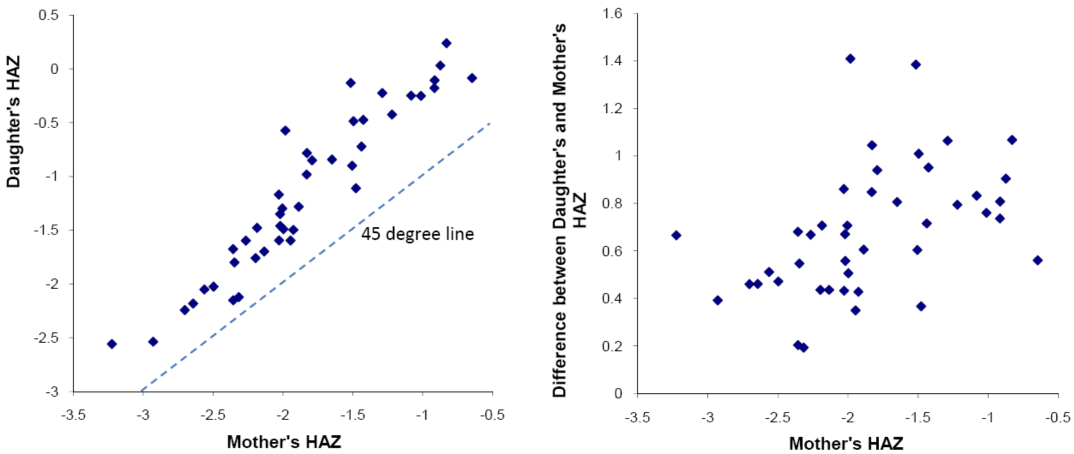


Figure 2 Intergenerational Phase Diagram for Female HAZ as Function of Socio-Economic Status

2.1 Level as function of level — 2.2 Difference as function of level

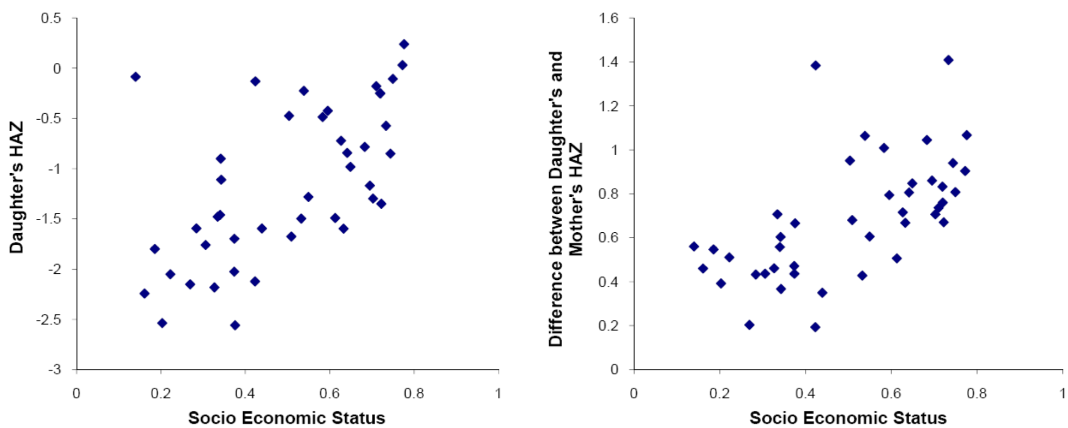
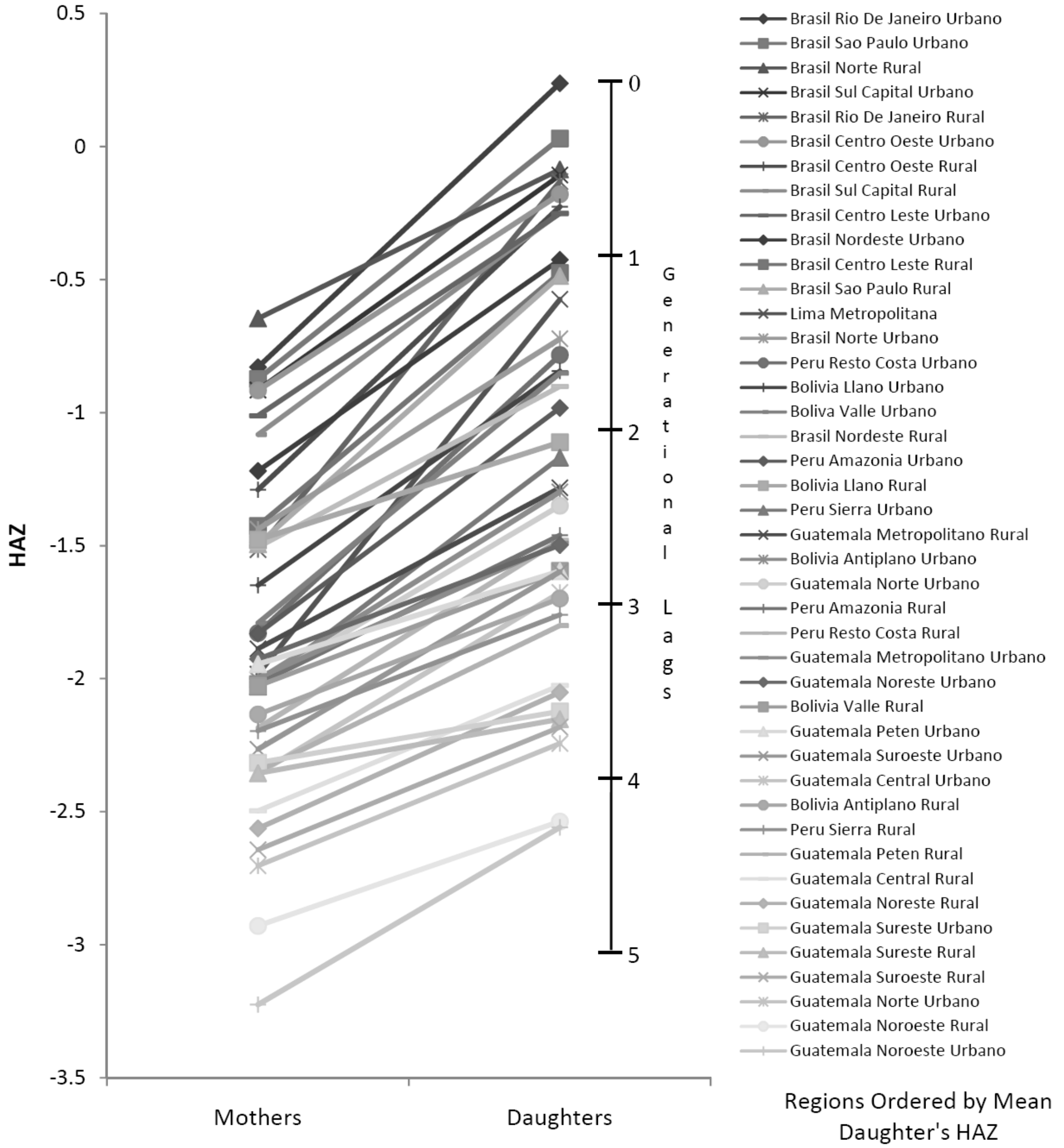


Figure 3 Stratified and Divergent Human Development: Intergenerational Evolution of Mean Regional Female HAZ



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