# Greenness and education inequalities in life expectancy (LE) in Latin American cities: an ecological study

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## Background

Greenness is linked to improved human health and recent evidence, mostly from high-income countries, further link higher greenness with narrower socioeconomic health inequalities.

## Objectives

To examine whether and how education inequalities in Life expectancy (LE) vary by greenness Latin American cities.

## Methods

SALURBAL study data for 28 cities and 671 sub-city units (>10 per city) in 9 countries (Argentina, Brazil, Chile, Colombia, Mexico, Panama, and El-Salvador) for the period 2012-2016.

Outcome: Sub-city data on LE at birth.

Exposure: Education as calculated by the percentage of residents with high school/university education.

Effect Modifier: Sub-city greenness as calculated using the satellite image-derived normalized difference vegetation index (NDVI).

## Results and Interpretation

Education disparities in LE increase in greener areas (**Table 1** and **Figure 1**). Given the already wide intra-urban inequalities in Latin American cities, and the sparse and unequal distribution of urban green spaces, greening policies need to make a concerted effort to ensure that unequal access to green spaces does not exacerbate existing health inequalities.

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**Table 1.** Associations between area-level education and LE and interaction effects by sub-city greenness (n=671)

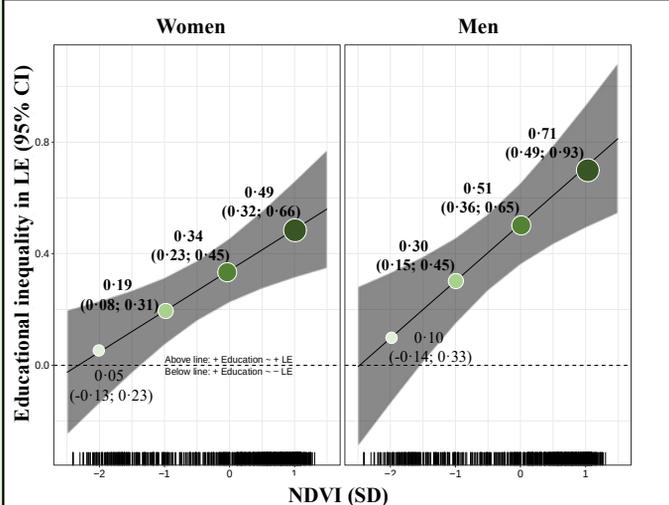| | Women β, 95% CI | Men β, 95% CI |
|---|---|---|
| **Education** | **0·34 (0·23; 0·45)** | **0·51 (0·36; 0·65)** |
| **Greenness** | -0·04 (-0·33; 0·24) | **0·39 (0·03; 0·75)** |
| **Education* Greenness** | **0·15 (0·05; 0·24)** | **0·20 (0·08; 0·32)** |



**Figure 1.** Association between area-level education and LE (Educational inequality in LE) by levels of greenness

The lines (bands) in **Figure 1** represent the coefficients (95% CIs) of the association between education and LE, by levels of greenness. The horizontal dashed line represents a lack of association between education and LE. To ease interpretation, when the education coefficient is closer to the null (horizontal dashed line), the educational inequality is narrower. For example, in men, a 1-SD increase in education is associated with a 0.10, 0.30, 0.51 and 0.71-year increase in LE in areas with low (-2SD), medium-low (-1 SD), average (0SD), and medium-high (+1SD) greenness, respectively.

Effect estimates were derived from **Table 1**, including coefficients for education, greenness, their interaction, and all confounders. Estimates and 95% CIs obtained from a linear combination of the main education coefficient and the interaction coefficient, using the glht package in R.