

Title: Living in an Urban Environment Is Associated with Increased Blood Pressure and Arterial Stiffness

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Abstract:

Background: Regions of South Asia are undergoing rapid urbanization. Satellite derived land cover data can be used to assess the impact of living in an urban environment on cardiovascular disease risk.

Methods: Baseline data for 8027 individuals enrolled in the population-based PURSE-HIS Study were included (mean age 43.6 yrs; 55.9% female). Individuals lived within 80km of Chennai, India. Home addresses were geo-located and joined with 2010 land cover data with 500m resolution. Bivariate and multivariate associations between land cover type (urban, crops, trees/shrubs, grass, other) and cardiovascular risk were tested. Systolic blood pressure (SBP), diastolic blood pressure (DBP), and hypertension (SBP \geq 140 mmHg or DBP \geq 90 mmHg) were determined. Pulse wave velocity (PWV, a measure of arterial stiffness) was determined by applanation tonometry. Multivariate models were controlled for standard cardiovascular risk factors.

Results: Significant differences in SBP ($p < 0.001$), DBP ($p < 0.001$), and PWV ($p = 0.039$) were seen between participants residing in urban areas (SBP = 127.8 mmHg; DBP = 78.9 mmHg; PWV = 8.35 m/s) and those living in non-urban areas (SBP = 118.8 mmHg; DBP = 75.2 mmHg; PWV = 8.07 m/s). People living in urban areas were also more likely to have hypertension (OR = 1.82; 95 %CI = 1.62 - 2.06) compared to people living in non-urban regions. Compared to people living in urban regions, individuals living in areas with crops had a 9.3 mmHg lower mean SBP ($p < 0.001$) and a 3.1 mmHg lower mean DBP ($p < 0.001$). People living in areas with trees/shrubs and grass also had significant reductions in SBP of between 5.5 and 7.0 mmHg and reductions in DBP of between 3.0 and 3.1 mmHg ($p < 0.001$).

Conclusions: Living in an urban environment is independently associated with increased blood pressure and PWV. Future research is needed to determine what components of the urban environment contribute to increased levels of cardiovascular disease risk.