Determinants of Stunting in Different Regions of Peru

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Background

Globally, undernutrition is responsible for over 3 million child deaths each year (Black et al., 2013). Poor infant and child growth is also linked to long-term deficits in academic achievement, cognitive development, and economic opportunities later in life (Adair L.S. et al., 2013; Martorell R. et al., 2010; Walker S.P., Chang S.M., Powell C.A., Simonoff E., & Grantham-McGregor S.M., 2007). Low height for age, or stunting, is a measure of chronic malnutrition. Caloric deficiencies, micronutrient deficiencies, intestinal parasites, and diarrheal diseases all directly contribute to undernutrition and growth failure (Guerrant R.L., Schorling J.B., McAuliffe J.F., & De Souza M.A., 1992; UNICEF, 1998).

Peru is a geographically diverse country that has experienced great economic growth in the last decade with subsequent improvements in health. Stunting in children under five dropped from 31.6% in 2000 to 19.6% in 2011 (Sobrino M., Gutiérrez C., Cunha A.J., Dávila M., & Alarcón J., 2014). Despite this overall improvement, a growing disparity has emerged: Urban and coastal areas have seen the greatest drop in stunting, but the prevalence of stunting remains high in rural and mountainous Andean areas (Gajate-Garrido G., 2014).

Methods

A secondary analysis of the 2012 Peru Demographic and Health Surveys (DHS) was performed using Stata/SE 14.1. Indicators from the child health data set were used to describe the prevalence and predictors of stunting. Sample weights were applied to ensure correct significance and error estimation.

The binary Improved Toilet Facilities and Improved Source of Drinking Water variables were recoded from the original categorical toilet type and water source variables. Improved facility definitions were taken from the World Health Organization and UNICEF joint monitoring program. Dietary diversity was developed as to measure how many healthy food groups a child had eaten the previous day.

Chi square analyses were performed to determine differences in stunting prevalence among the different geographic regions and locations. Logistic regression analyses were performed to determine which variables are the strongest predictors of stunting.

Results

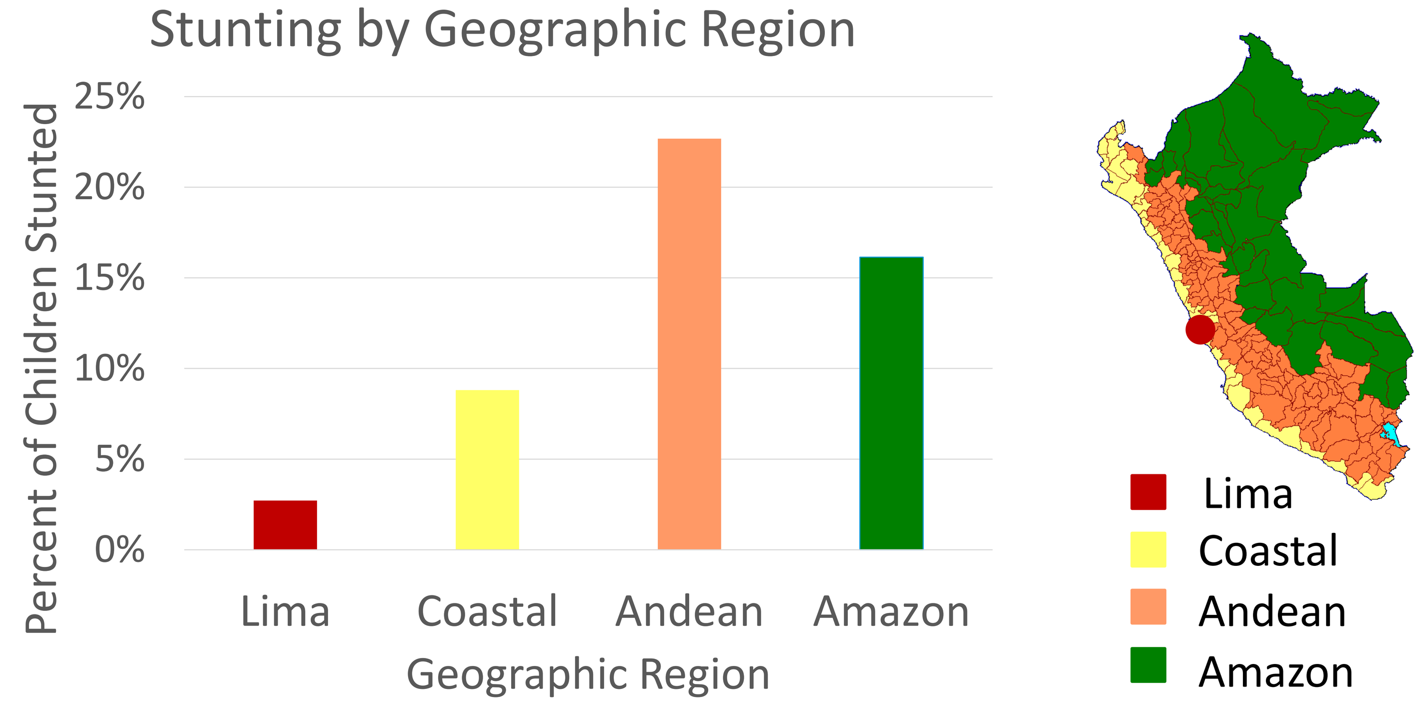

Figure 1: The prevalence of stunted growth in children under five years of age in the different geographic regions of Peru. Lima has the lowest prevalence at 2.7%, followed by coastal region with 8.8% stunting. The Amazon region experiences 16.14% prevalence, while nearly 23% of children in the Andean highlands are stunted.

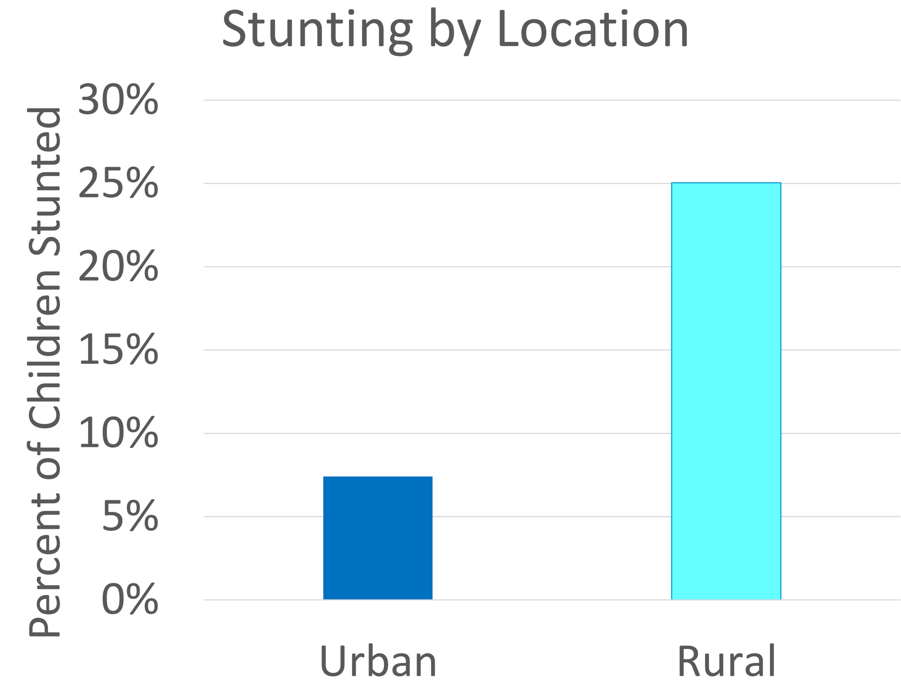

Figure 2: The prevalence of stunted growth in children under five years of age in urban and rural locations. In urban localities, 7.5% of children under five are stunted, while in rural locations, 25% of children face stunting.

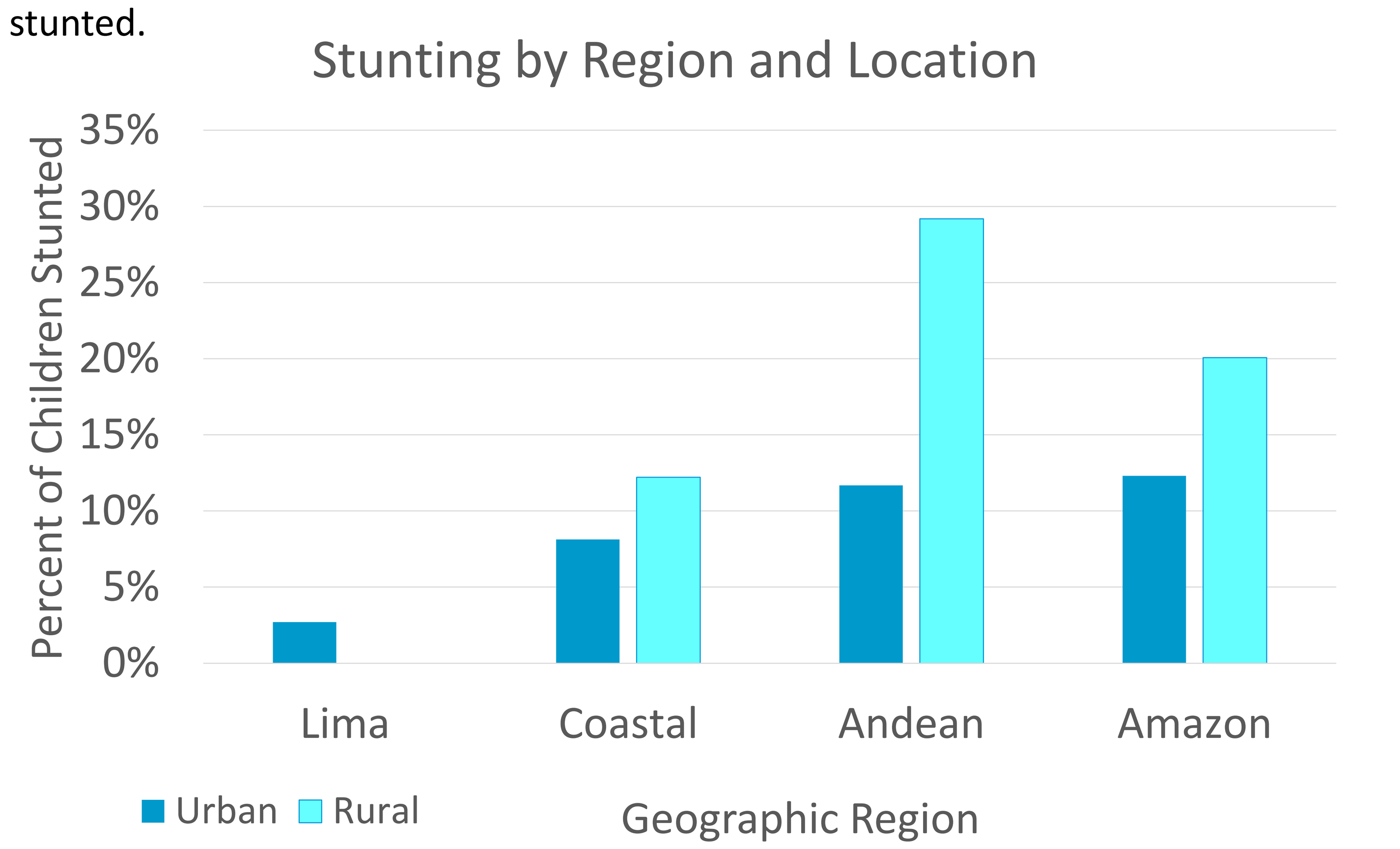

Figure 3: The prevalence of stunting among children under five years of age stratified by geographic region and location. Andean Rural areas have the highest prevalence of stunting, at 29%.

Figure 4. Predictor variables were chosen to represent WASH-related issues, wealth, and dietary diversity.

Predictors of Stunting among the different geographic locations, Odds Ratios

Odds Ratio	Wealth	Anemia	Toilet	Water	Diet	Flooring	Diarrhea
Lima	0.700	0.432	1.178	0.523	1.041	1.783	1.059
Coastal Urban	**0.483*****	1.432	0.753	1.190	0.955	0.969	1.002
Coastal Rural	0.686	2.659	0.522	1.465	**.836***	0.626	0.914
Andean Urban	**0.651*****	**1.643***	0.743	0.764	1.010	1.056	1.149
Andean Rural	**0.531*****	1.215	**0.654****	**1.510***	1.019	0.976	1.044
Amazon Urban	**0.474*****	1.206	0.748	0.820	1.034	1.173	1.271
Amazon Rural	**0.453****	**1.335***	0.481	**.656***	0.950	0.703	0.976

* p<.05, ** p<.01, ***p<.001

Figure 5. The odds ratios for the significant predictor variables for stunting among the different geographic locations in Peru. Lima was the only region with no significant predictors. Increased Wealth Index score reduced the odds of being stunted all areas except Lima and Coastal Rural. Being currently anemic increased the likelihood of stunting by 64% in Andean Urban and by 35% in Amazon Rural areas. Improved Toilet Facilities decreased the likelihood of stunting by 34.6% in the rural Andes. Dietary diversity decreased the likelihood of stunting by 16.4% for each additional food group consumed. Improved water sources reduced the odds of stunting in the rural Amazon, but actually increased the odds of stunting by 51% in the rural Andes.

Discussion

The prevalence of stunting significantly varies among the different geographic locations in Peru. While the national prevalence of stunting is measured at 13.5%, **large disparities** exist between different regions and localities.

Rural Andean areas have the highest rates of stunting in the country, approaching 30% prevalence. While a few other studies have analyzed Peru DHS data to determine stunting risk factors at a national level, no recent studies have explored the determinants of stunting by region and urban or rural location.

Wealth Index was significantly associated with stunting in most geographic locations. In Coastal Urban and Amazon Urban areas, it was the only significant predictor.

Dietary diversity lowered the odds of stunting in the Coastal Rural region. While this is not a specific measure of micronutrient status, it suggests that family food choices or food availability may affect stunting in this region.

Anemia status (adjusted for altitude) was significantly predictive in Andean Urban and Amazon Rural regions. Anemia can be a response to living at high altitudes, vitamin or iron deficiencies, or blood loss. Intestinal parasites often decrease nutrient absorption in the gut and can cause intestinal bleeding. Further research is needed to clarify the cause of anemia and its role in stunting in these areas.

Improved toilet facilities were associated with decreased odds of stunting in Andean Rural areas. Poor sanitation is a leading cause of intestinal infections, which can lead to poor growth outcomes. Interestingly, using an improved drinking water source increased the likelihood of stunting by 51% in the rural Andes, yet decreased the odds of stunting in rural Amazon areas. It is possible that public water infrastructure does not provide safe drinking water. Water-borne parasites and diseases may increase the prevalence of stunting due to intestinal malabsorption.

It is important to continue to focus on **malnutrition** in Peru even as the prevalence continues to drop. National level infrastructure improvements and nutrition programs may mitigate stunting in some regions. Addressing the rising health disparities will ensure that all children have the opportunity for a healthy and productive life.

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