Identifying Target Areas for Integrated Nutrition Interventions in Zambia

Relationship between water & malnutrition

Malnutrition is influenced by determinants at multiple socio-ecological levels. At the environmental level, water influences malnutrition in various ways: poor water quality can cause diarrheal disease and, over time, environmental enteropathy which inhibits the absorption of nutrients; drought can lead to household food insecurity. Nutrition interventions that encompass underlying factors, such as improved water sources, are ideal for better health outcomes.

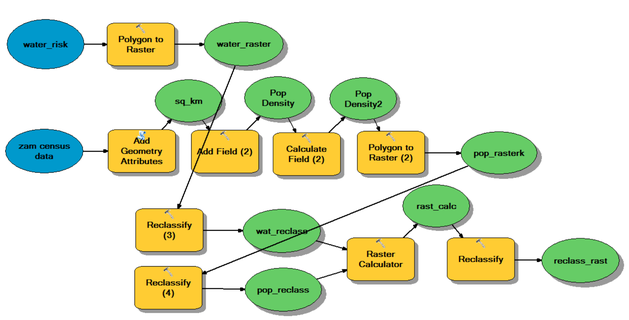
Stunting is one form of malnutrition characterized by low height for age that is influenced by water-related factors. High rates of stunting are observed in Zambia. The purpose of this analysis is to characterize the Zambian landscape based on population density and water-related risk, in order to identify ideal target areas for more integrated nutrition interventions.

Methods

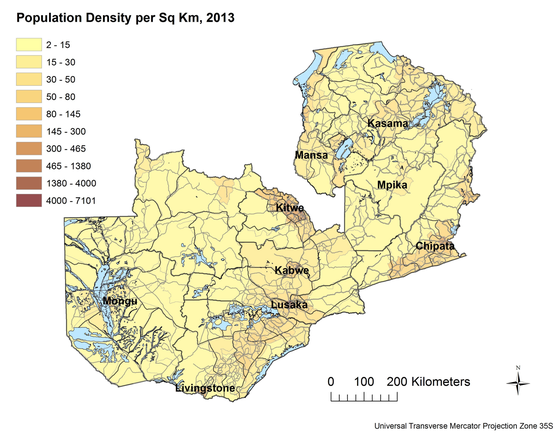
The 2013 census data were collected by the US Census Bureau and available through the Demographic and Health Survey Program (DHS). Population density was calculated per square kilometer. Water-risk data were obtained from the 2013 Aqueduct Water Risk Global Maps data, available through the World Resource Institute. The variable used represents an aggregate 'overall water-risk' score based on 12 global indicators grouped into 3 categories: quantity, quality, and regulatory and reputational risk. The unit of analysis for both datasets is the sub-national districts. Both datasets were converted to raster using the 'polygon to raster' tool, reclassified into low to high scores using the 'reclassify' tool, and then input into the raster calculator. The raster calculator derived a score for areas with the highest population density and water-related risk (1=highest, 4=lowest).

Stunting data was also obtained through DHS, however for confidentiality reasons these data are not intended to be representative below the regional level. Frequencies of stunting by the DHS cluster locations are summarized and displayed for 2 selected target areas.

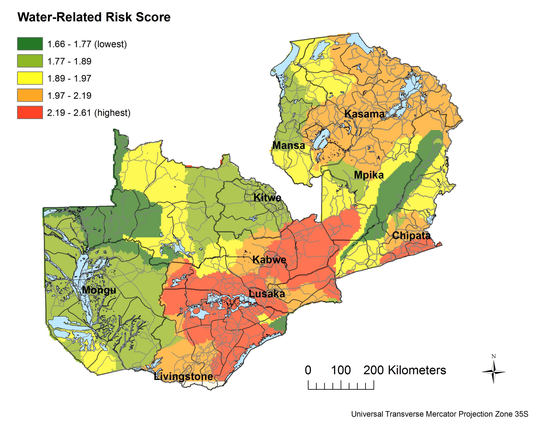
For all maps, the Universal Transverse Mercator Projection was used.



Population density
US Census Bureau Subnational Estimates, 2013 DHS



Exposure to water-related risks
2013 Aqueduct Water Risk Global Maps

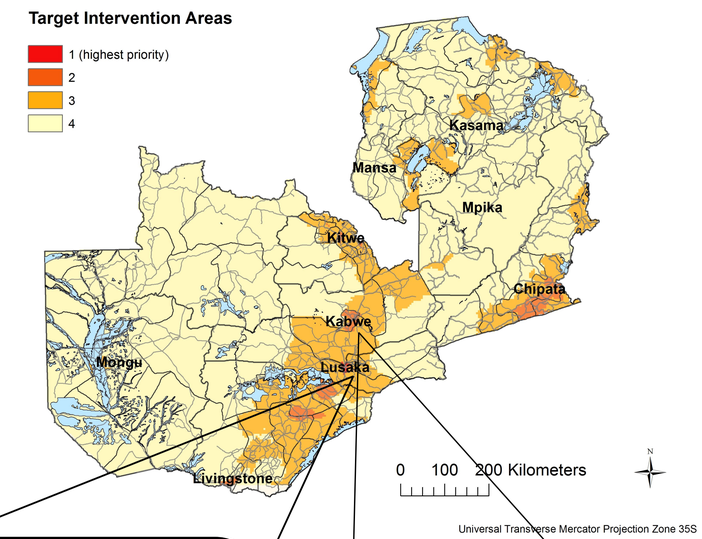


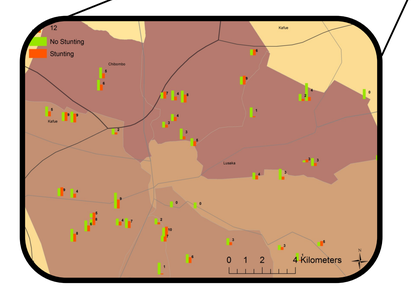
Limitations

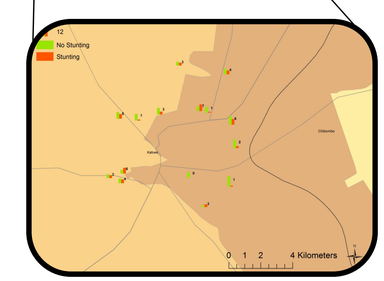
These data are an imperfect representation of the real-world entities which they express. There are several important limitations to consider. There are likely more fine-grained variations and patterns across the landscape than what can be distinguished at the sub-national district level. Use of an aggregate score for water risk from various sources may limit reliability and accuracy. Due to confidentiality reasons, DHS data could not be summarized below the regional level. However, frequencies by the DHS sample cluster locations (presented here) help to understand the patterns that may exist within each cluster.

BREANNE K. LANGLOIS, DECEMBER 2015

Results







Unweighted frequencies of stunting among children < 5 in the DHS sample, by cluster location

Based on the derived score, ideal intervention locations were identified. According to this model, Lusaka had both the highest population density and overall water related risk. Kabwe, Chipata, and Livingstone were also identified as target locations.

Sources:

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