Stunting Prevalence in Cambodia:
## An exploration of potential underlying factors

Caroline Nathan, May 2015, NUTR 231

Background

Although it has seen considerable economic growth and political stability after decades of civil conflict, Cambodia still remains a food insecure country with significant nutritional challenges. Stunting is an indication of chronic malnutrition and is measured as below minus two standard deviations from the median height-for-age of the reference population.

Stunting rates have remained persistently high in Cambodia, especially in rural households. There is a high disparity between urban and rural stunting rates. The latest estimates from the 2014 Demographic and Health Survey indicate a stunting prevalence in rural households of 34% (down from 42% in 2010), while the prevalence in urban households is estimated to be 24% (down from 28% in 2010). A conceptual model developed by UNICEF for understanding undernutrition identifies three main underlying causes of undernutrition: household food insecurity, inadequate care, and unhealthy household environment and lack of health services.
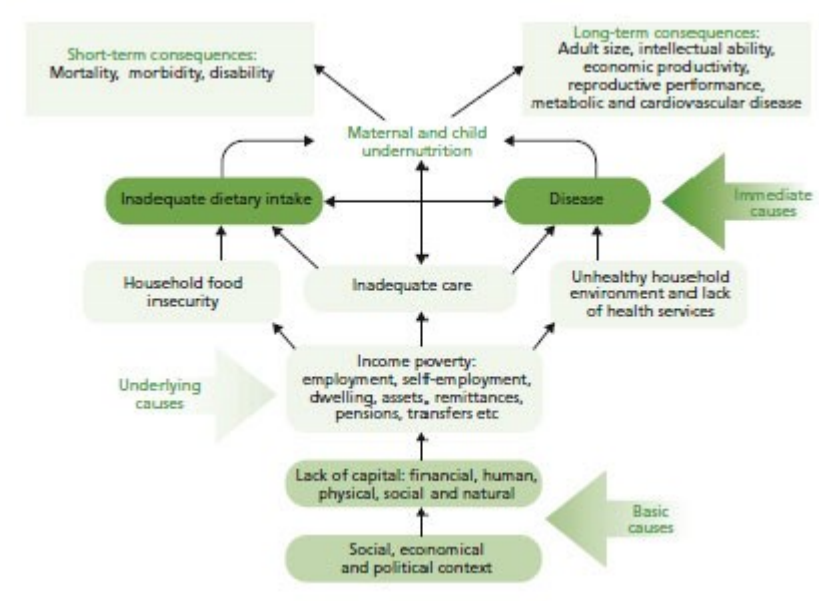
Estimated Stunting Prevalence by Commune

Main Roads
Stunting Prevalence by Commune
< 20%
20 - < 30%
30 - < 40%
40 - < 50%
>= 50%
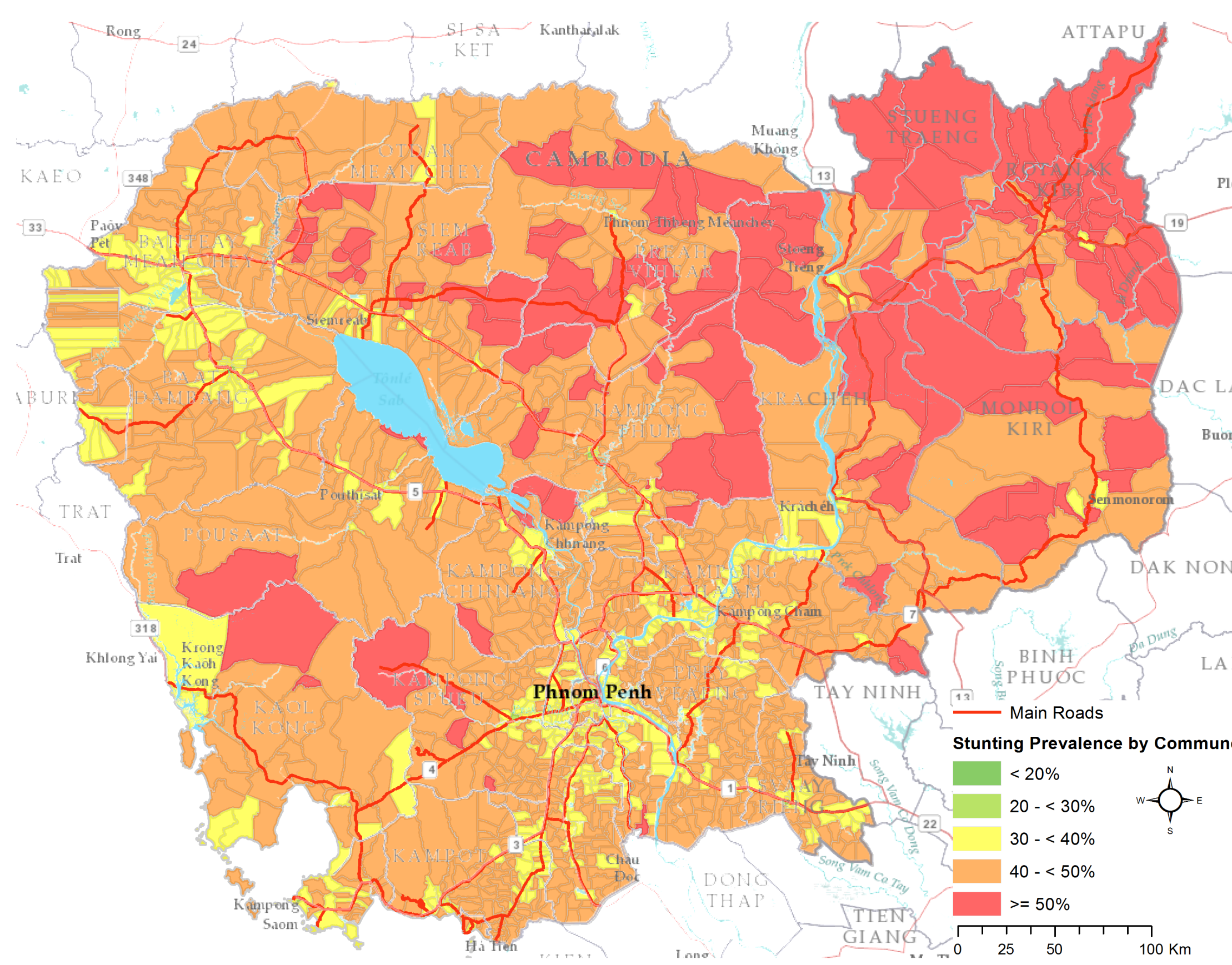
Methodology

Stunting: The stunting estimates used in this project were produced by the UN World Food Program and the Royal Government of Cambodia for a 2013 report investigating the link between poverty and child malnutrition in Cambodia. Using data from the 2008 General Population Census of Cambodia, the 2009 Cambodia Socio-economic Survey, the 2008 Cambodia Anthropometric Survey, the 2010 Cambodia Demographic and Health Survey, and the 2009 Commune Database, the authors utilized a small-area estimation approach to estimate malnutrition and poverty at the commune level, and found their estimates to be "generally reasonably precise."

Rice Cultivation: The percent area of each commune covered by rice cultivation was estimated using the intersect tool.

Main Roads: The distance from main roads was estimated using Euclidean distance. Average distance per commune was calculated using zonal statistics.

Health Centers: The distance from health centers was estimated using Euclidean distance. Average distance per commune was calculated using zonal statistics.

Average Distance from Health Centers

Health Center
Main Roads
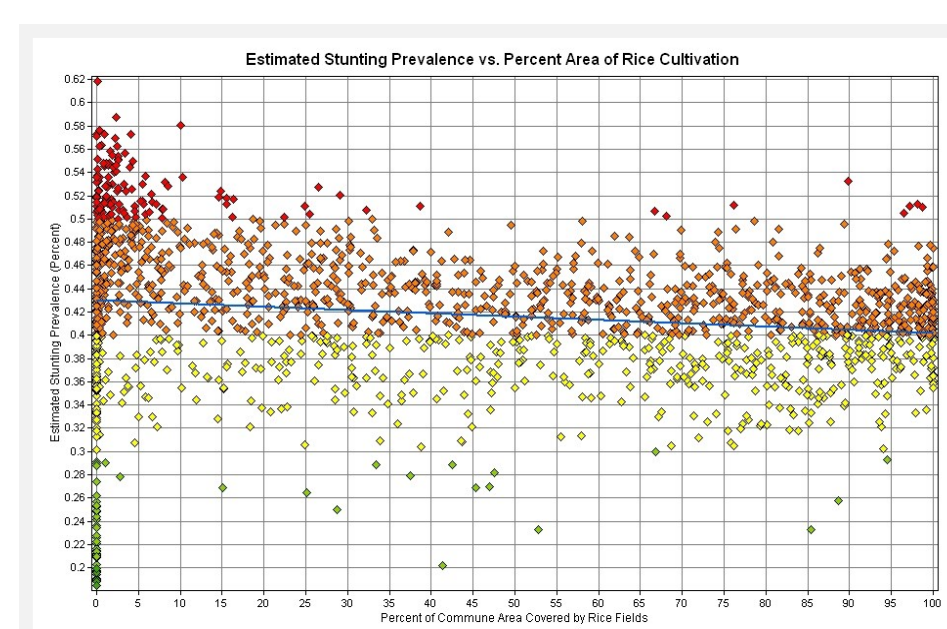Distance from Health Centers
Value (meters)
High : 85285.4
Low : 0
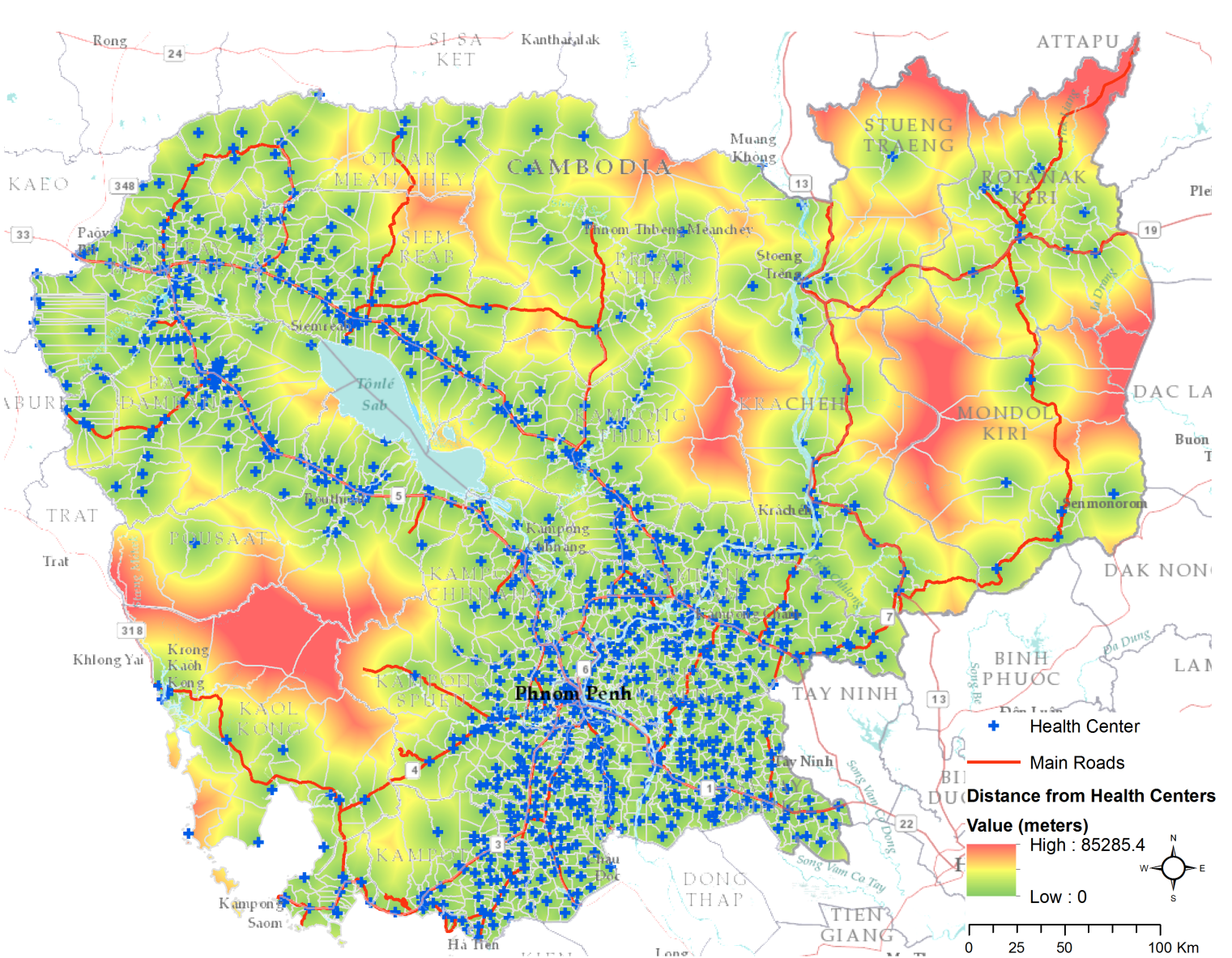
Access to health care facilities is an important underlying determinant of nutritional status, as indicated in the UNICEF conceptual framework. Health center locations are from 2006, provided by the Ministry of Health. Since stunting information is from 2010, the comparison of stunting prevalence to health center location is missing four years of health center data. With this in consideration, the blue trend line on the scatter plot above shows an increasing trend toward higher prevalence of stunting as the average distance from health centers increases. R values were not calculated for any of the three scatter plots.
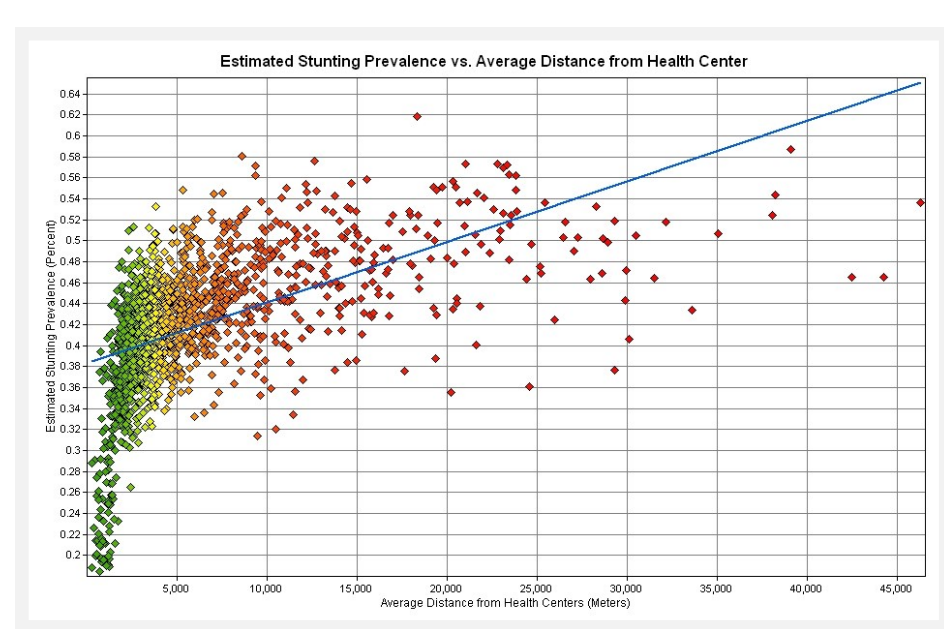
## Area of Rice Cultivation

Ricefields
Main Roads
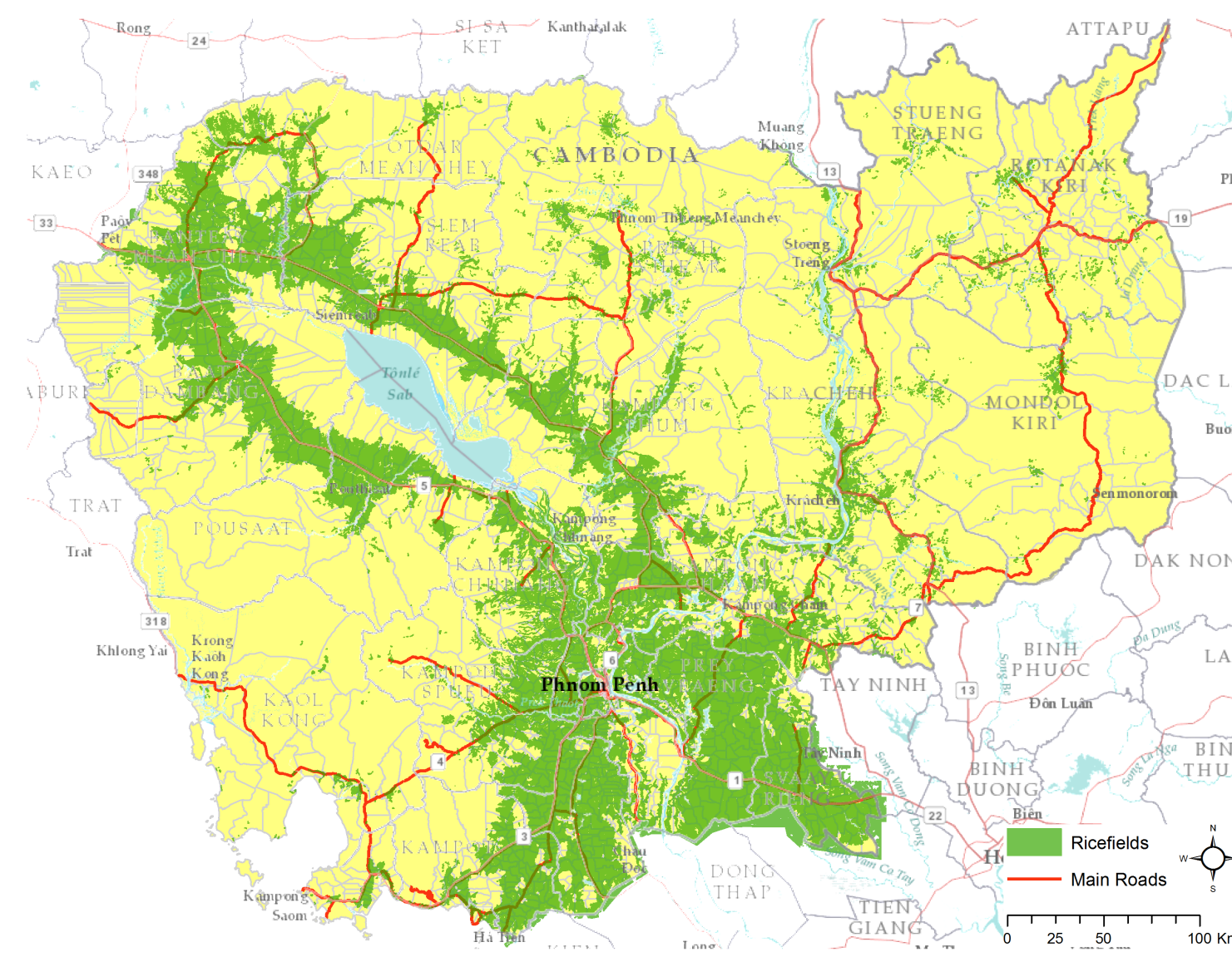
Rice cultivation could possibly relate to stunting through several channels. Rice-based diets are lacking in most essential micronutrients necessary to provide a minimum acceptable diet for children. However, rice cultivation could generate income that might be used to purchase more nutrient-dense foods. Conversely, this income could be used to purchase non-food goods and services. The rice cultivation data was published by the World Food Program in 2013, but the collection year is unknown. The scatter plot above shows only a very slight trend in the relationship between area of rice cultivation and stunting prevalence.

Average Distance from Main Roads

Main Roads
Distance from Main Roads
Value (meters)
High : 75677.5
Low : 0
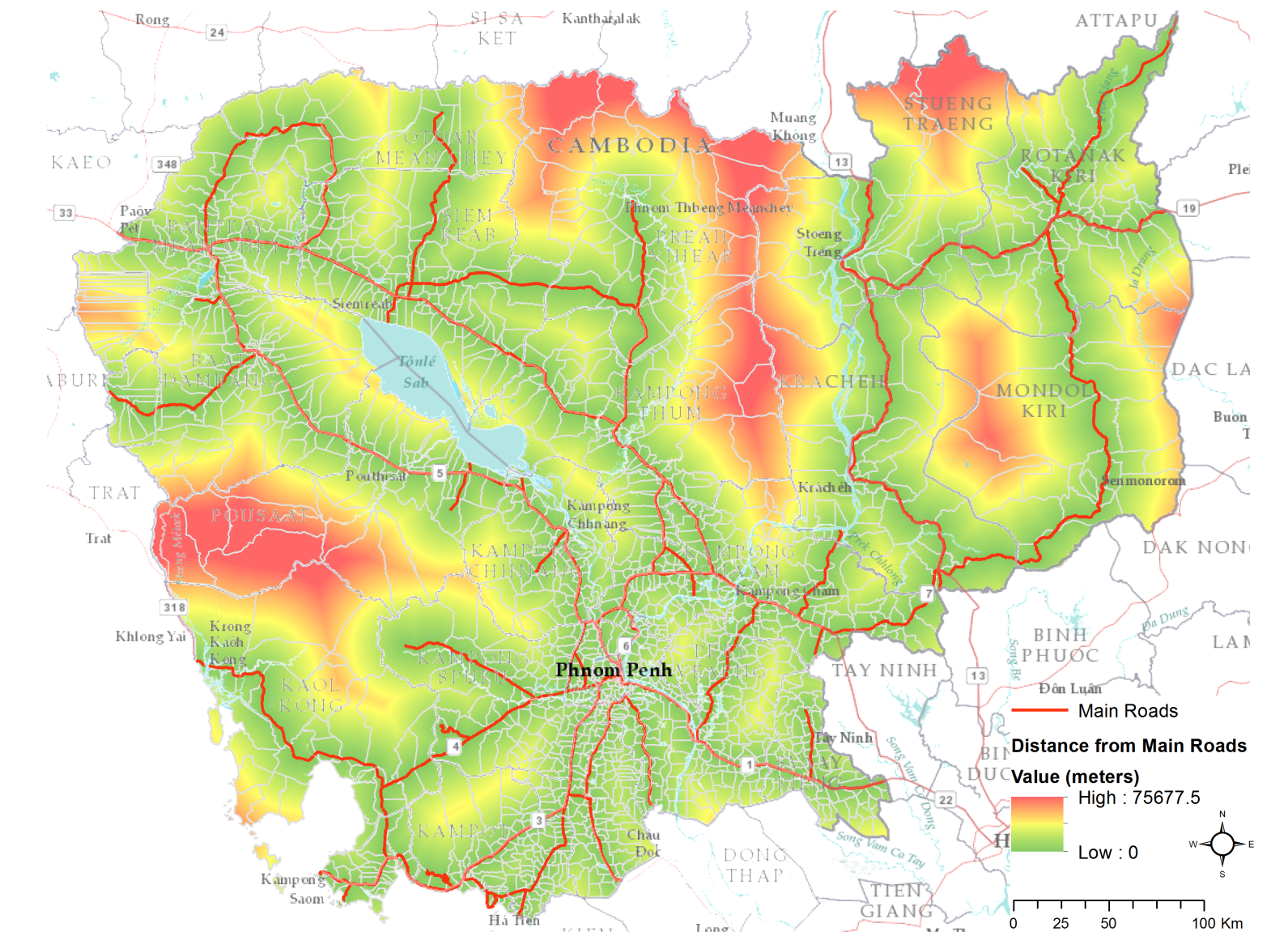
Access to main roads could mean access to health care, larger and more diverse food markets, supplies for improving water and sanitation, and a host of other goods and services, all of which could possibly affect stunting prevalence. Roads data is from 2009, provided by the Ministry of Public Work and Transport, and only shows major roads. Minor roads could provide a more detailed analysis. The scatter plot generated from the data shows a trend in the relationship between greater average distance from main roads and greater stunting prevalence.
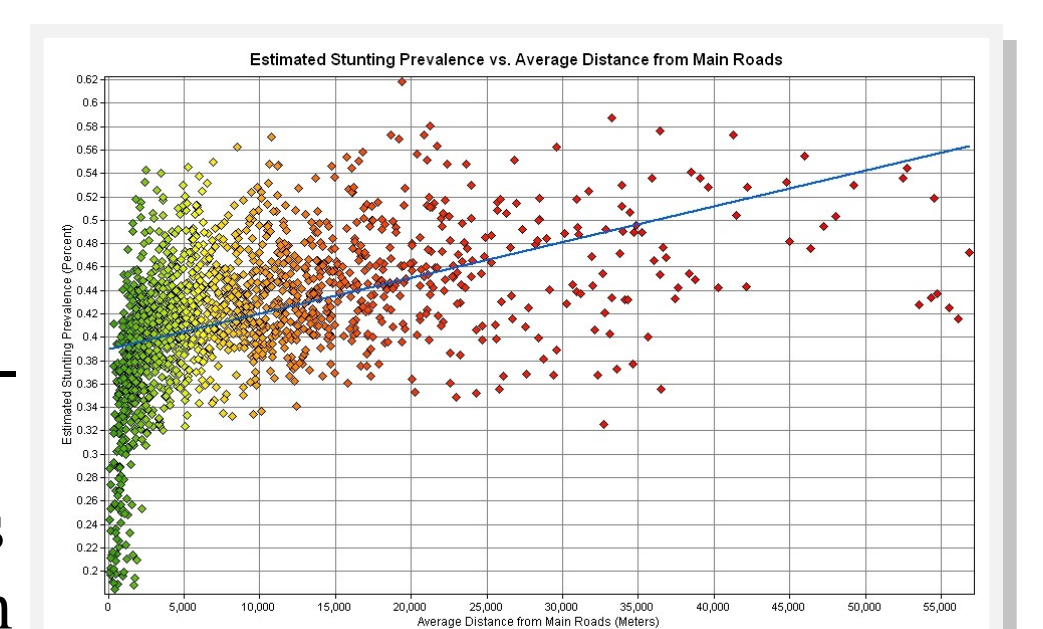
Discussion and Conclusions

This project set out to investigate how spatial patterns of stunting in Cambodia might relate to possible underlying contributors to undernutrition. Data was limited by a few factors. First, although communes are the smallest administrative unit in Cambodia, using these otherwise arbitrary boundaries to show patterns in prevalence inevitably creates or hides patterns that exist within and between households and villages in reality. Second, stunting data was only an estimation from household surveys, and cannot be taken as completely accurate. Third, Euclidean distance is "as the crow flies" and does not take paths or roads into account, especially since minor roads were not included in this project. As already discussed, the road and health center data was from 2009 and 2006, respectively, while the

stunting estimates were from 2010, so comparisons were missing multiple years of data. Errors of commission or omission are likely for the health center data in particular, considering the possibility of new health center construction resulting from government and NGO programs to scale up health center coverage throughout Cambodia.

Due to the nature of the data, limited conclusions can be drawn about how levels of stunting might be related to distance from main roads, health centers, and the amount of rice cultivation per commune. Further analysis including more recent data, along with data on access to improved water and sanitation facilities, could be used to design targeted interventions for specific areas with high vulnerability for stunting.

Sources

Cambodia Poverty and Malnutrition Data by Commune, April 2013, World Food Program; published by the World Food Program http://geonode.wfp.org/layers geonode:khm_pop_povertyandmalnutrition_wfp_26042013#attributes, accessed March 21 2015.

Hydrography, 2009, Geographic Department, Ministry of Land Management, Urban Planning and Construction; accessed on Tufts M drive March 21 2015.

Main Roads, 2009, Ministry of Public Work and Transport; accessed on Tufts M drive March 21 2015.

Health Centers, 2006, Ministry of Health; accessed on Tufts M drive March 21 2015.

Rice Cultivation, 2013, Department of Geography of the Ministry of Land Management, Urban Planning and Construction; published by the World Food Program E:\gis_final_pt3\Sources\WFP\khm_phy_ricefield_gov\Cambodia Rice Fields — geonode.wfp.org.html

Basemap: Esri, Delorme, USGS, NPS

Causal Framework of Malnutrition (UNICEF 1990, reproduced in Black et al 2008), accessed from http://www.heart-resources.org/topic/nutrition/ April 30 2015.

Cambodia Demographic Health Survey, 2010, Ministry of Health and Ministry of Planning; http://www.moh.gov.kh/files/cdhs2010full.pdf

Cambodia Demographic Health Survey: Key Indicator Report, 2014, Ministry of Health and Ministry of Planning; http://dhsprogram.com/pubs/pdf/PR60/PR60.pdf

Projected Coordinate System: Indian 1960 / UTM Zone 48N

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