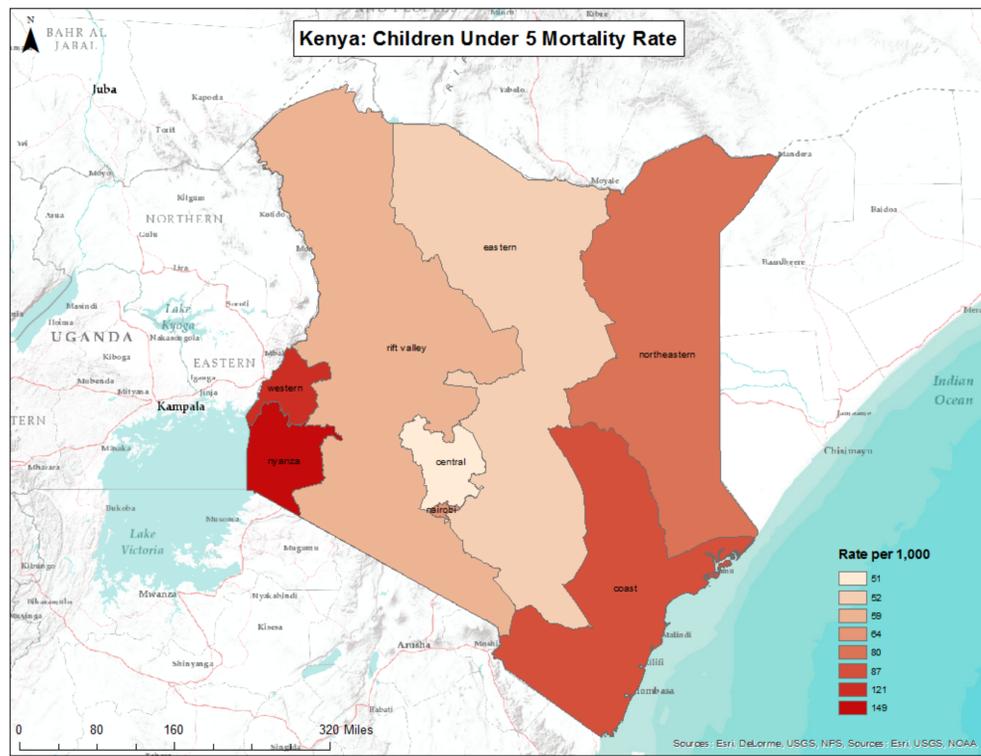


WASH in Kenya: An Urban-Rural Divide

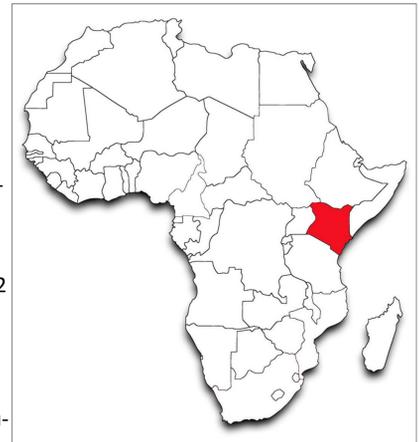
An analysis of discrepancies in children-under-five health outcomes



Map A. Under-five mortality rates by province

BACKGROUND

Water, sanitation and hygiene (WASH) has grown in developmental importance over that last few years. There is a growing body of evidence that poor WASH practices have numerous impacts on child health outcomes. The spread of this impact touches many other components of overall health and development. According to current statistics, a child dies from a water related illness every minute around the world. Moreover, diarrheal disease specifically kills an estimated 2 million people per year, of which, 90% has been attributed to water, sanitation, and hygiene.



Kenya specifically has made significant developmental strides, particularly in relation to “Under 5” mortality. Additionally, overall life expectancy has improved greatly, resting now at 62 years. However, despite these strong improvements, almost half the country still resides below the international poverty line. With very few urban centers, and a population doubling in the last 25 years, the majority of the country is still living in rural areas, creating huge divides in poverty, equality, health outcomes, and other factors affecting livelihood and health. Under-five mortality nationally is 74 deaths per 1,000 live births. However, that rate more than doubles in particular provinces (notable, the Coast, Nyanza, and Western regions). Similar trends can be seen in the incidence of diarrheal disease.

This project aims to address questions around why such huge discrepancies exist in child morbidity and mortality, and to examine any potential spatial relationships that may exist.

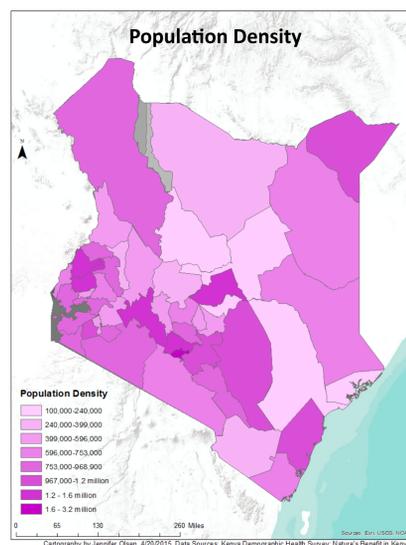
METHODOLOGY

Data was requested and acquired from the Demographic and Health Survey Program for Kenya 2008-2009. National, subnational (provincial), and household data was analyzed. The survey data from SPSS was exported to Excel and then joined with GPS data points and the variables of interest were plotted. Other data sources include Nature’s Benefit in Kenya from the World Resources Institute 2007.

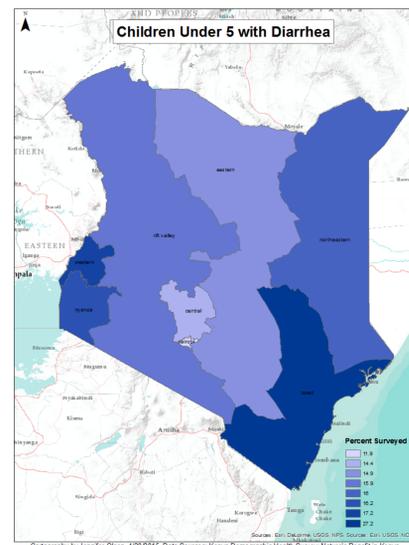
After joining the data, the variables of interest were examined: overall under-five mortality, diarrheal disease (overall reported and bloody diarrhea reported), and population density by county. These three variables were examined separately for comparison using graduated colors by province/county.

Variables that were suspected to be associated with the child health discrepancies were then analyzed: knowledge of ORS, health facilities, elevation, and inequality. ORS was plotted simply through graduated colors of unique values by province. Health facilities were examined and district hospitals were selected over all facilities, as health centers and distributaries were included, which are often limited in their capacity for severe health issues. A new layer was created with just hospitals. Elevation was used to create contours using the spatial analyst toolbox to examine any trends relating to Kenya’s fluctuating topography. Contours were created at both 600 meter and 100 meter intervals, to examine the trends more distinctly. Lastly, inequality was measured using the average GINI coefficient as a graduated symbol. Child mortality and diarrheal disease were joined to create a background reference for province and hospitals. A kernel density for hospitals was also analyzed but did not add to the overall understanding of discrepancies and so was not included in the final presentation.

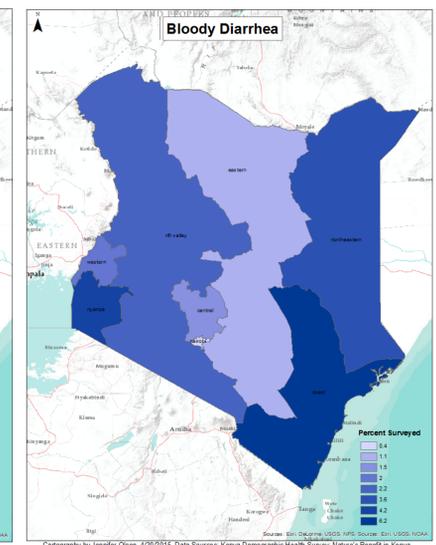
Map B. Population density by county



Map C. Incidence of diarrhea



Map D. Incidence of bloody diarrhea

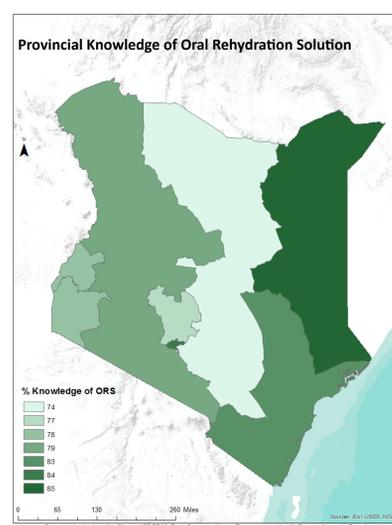


RESULTS

Overall, we can see the provincial discrepancies in child mortality and diarrheal disease clearly. Mortality is well above the national average in the Northeastern, Coast, Western, and Nyanza region, where risk of under-five mortality is dramatically higher than the Central, Eastern or Rift Valley regions. The main urban hub, Nairobi, has an under-five mortality rate of only 64. Diarrheal disease follows a similar trend. While the average incidence of diarrheal disease is 17%, and Nairobi, 11%, incidence swells to almost 30% in the same outer regions. Population density is higher in many places with high morbidity and mortality (such as the Western half of the country), however, Nairobi does not follow the same trend. Looking at our potential factors, Knowledge of ORS is quite high throughout Kenya, with the lowest knowledge at 74%. Map F and G take the topography into account and reveal that many hospitals are located along high elevations and, in general, are populous in the high morbidity and mortality regions. Inequality is particularly interesting as it shows much greater inequality at high elevations than in the valleys.

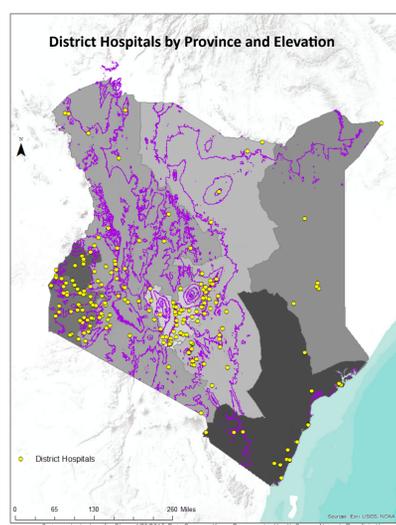
DISCUSSION

Child health outcomes in Kenya, though improving, are doing so disproportionately. This analysis has looked at some of the most likely culprits of urban-rural discrepancies, and found no remarkable patterns. Though it does appear that the population is more heavily located in the higher elevations of the western half of the country, there are a greater number of hospitals in these regions. Inequality is higher in these regions but I cannot say conclusively that this is driving poor child health outcomes. Future analyses may benefit from examining the relationship between inequality and child health outcomes more closely, as well as the role elevation may play.



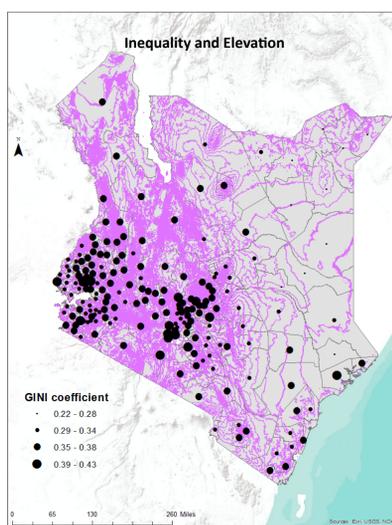
Map E.

This map is looking at the percent of the population surveyed with knowledge of oral rehydration solution, a key treatment option available to children suffering from diarrheal disease. ORS has been substantial in reducing mortality due to diarrheal disease as it can be easily prepared at home and does not require access to health facilities.



Map F.

This map is looking into access to district hospitals, with mortality and diarrheal disease embedded in the provincial base map. An elevation contour of 600 meters was also applied to gauge not only location but access to such facilities. Access to health care is known factor in child health outcomes and mortality.



Map G.

This map examines potential inequality in Kenya in relation to elevation. A contour of 100 meters was applied and the GINI coefficient was used to measure inequality. We can see an interesting cluster of high levels of inequality in regions that have the highest elevation.

Cartographer: Jennifer Olsen
School of Medicine. April 2015. PH262.
Special thanks to Thomas Stopka and Joel Kruger

Sources: DHS Program (2008/2009), World Resources Institute (2007), Nature’s Benefit in Kenya (2007)

