

## UNC-Chapel Hill DCRP Best Master's Project of 2013

# Predicting Effects of Urban Design on Public Health: A Case Study in Raleigh, N.C.

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*Editors' Note: Every year, faculty from the Department of City and Regional Planning at UNC-Chapel Hill determine the best master's paper developed out of the graduating class. Below is only an extended abstract of the project. To obtain the original, full-length document, please visit the "Electronic Theses and Dissertation Collection" at <http://dc.lib.unc.edu>.*

### Extended Abstract

This report presents results of a Health Impact Assessment (HIA) to quantify the health benefits of a small area plan proposed as a result of the Blue Ridge Road District Study, which focuses on increasing density, diversifying land use, and enhancing connectivity within the Blue Ridge Road Corridor (BRR) in Raleigh, N.C. Blue Ridge Road, located at the western edge of the city, is a major north-south thoroughfare. In spite of the substantial number of residents, employees, and visitors who travel within the BRR, the area lacks pedestrian infrastructure and has few attractions, residential areas, and retailers that are easy to visit on foot. Focus group discussions indicate that BRR residents wanted the ability to walk more comfortably and safely within the corridor to a greater number of destinations than currently exist.

In 2011, the BRR Work Group, made up of representative landowners and users of the BRR neighborhood (including Rex Healthcare, N.C. State University, the N.C. Museum of Art, the N.C. Department of Health and Human Services, the N.C. Department of Transportation, and others), commissioned the creation of a small area plan that advocated for changes in zoning to allow for mixed-use development at higher densities and the additions of bike lanes and sidewalks to all existing streets, as well as the addition of new streets to increase

road network connectivity. In order to increase support for the adoption of the plan, the group solicited funding from the BlueCross BlueShield of North Carolina Foundation and technical assistance from a team of professors from the University of North Carolina, Chapel Hill, to conduct an HIA in order to demonstrate the scope of the health benefits expected from the project.

Based on stakeholder input and priorities, the HIA focused on quantifying the benefits expected from increasing the suitability of the BRR neighborhood for transportation via walking (termed "walkability") throughout the corridor. The HIA focused on the approximately 10,000 current residents of the BRR (those living within 1.5 miles of the N.C. Museum of Art, at the center of the BRR neighborhood) and estimated health benefits for the years 2028 (when health benefits are expected to begin accruing if the redesign is completed by 2023) through 2048 (the end of a typical 20-year planning

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horizon).

The project team used data collected from a survey of 386 randomly selected BRRC residents, previous studies quantifying the effect of neighborhood walkability on time spent walking for transportation, baseline health data from the N.C. State Center for Health Statistics, and World Health Organization (WHO) guidelines to construct a computer simulation model that predicts the increase in physical activity and the resulting health benefits that would come from increasing walkability throughout the corridor. The simulation model includes five major health outcomes: premature mortality, type 2 diabetes, coronary heart disease, stroke, and hypertension. In so doing, this HIA joined a small handful of other U.S. HIAs that have made use of quantitative analysis methods. The results of the analysis indicate that implementing the small area plan will have significant health and economic benefits for BRRC residents. The simulation model predicts that increasing neighborhood walkability in the BRRC will increase the time that residents spend walking for transportation by 17 minutes per day, on average, for the 59% of residents who reported walking for transportation. No effects could be estimated for the 41% of residents who reported no walking, due to lack of available evidence. In turn, the model predicts that this increase in physical activity will decrease rates of premature mortality, diabetes, coronary heart disease (CHD), stroke, and hypertension. Table 1 shows the estimated total number of cases prevented over the time period 2028-2048 and the economic value (in today's dollars) of the avoided cases. In total, the economic value of the health benefits from a full build-out of the BRRC small area plan is more than \$313 million.

The estimates shown in Table 1 are restricted to

current residents of the BRRC who already spend at least some time walking for transportation each week. Several potentially important populations are excluded due to lack of information, and hence the results in all likelihood underestimate the health benefits of the BRRC redesign. First, the estimates do not consider the additional population expected to move to the BRRC should the redesign go forward; the Raleigh Urban Design Center expects that the total population could increase by more than 70% under the redesign by the year 2040, compared to normal growth conditions. Second, the prediction excludes the more than 16,000 workers in the BRRC, many of whom do not live in the neighborhood but are likely to benefit from the increased walkability near their workplaces. In addition, it does not account for the millions of annual visitors (a million annual visitors to the state fair and another 1.5 million visitors to PNC Arena) to the neighborhood. Furthermore, the team's conservative modeling approach assumes that time spent walking will increase those who are already active, since information was insufficient to predict the extent to which currently sedentary individuals will be induced to take up walking for transportation if the neighborhood is redesigned. Nonetheless, Table 1 represents the HIA team's best estimates of health benefits, given currently available information, for the population of current BRRC residents.

Based on the positive health impacts of the BRRC redesign, the HIA team collaborated with the project advisory board to craft recommendations intended to enhance the implementation of the small area plan and encourage people to walk. While the BRRC small area plan does not explicitly focus on health, the majority of

	<b>Best estimate and plausible range of cases avoided, 2028-2048</b>	<b>Fraction of all cases avoided</b>	<b>Total present value</b>
Deaths (premature)	80 (30-120)	7% (3-10%)	\$294,000,000
Diabetes (new cases)	27 (1-79)	2% (1-6%)	\$3,740,000
CHD (new cases)	8 (2-15)	Females: 2.5% (0.6-4%) Males: 0.5% (0-2%)	\$1,110,000
Stroke (new cases)	17 (1-44)	2% (0.06-4%)	\$4,110,000
Hypertension (new cases)	91 (4-250)	2% (0.2-3%)	\$11,000,000

**Table 1.** Estimated health benefits of BRRC small-area plan (full build-out)



the design changes proposed support the creation of an environment in which walking is safer and easier with a greater variety of places to which people can walk. The recommendations focus on two complementary and mutually reinforcing strategies: (1) increasing the quantity and quality of infrastructure for active transportation within the BRRC and (2) increasing the number of destinations that residents can walk to within the BRRC.

The top recommendations of the project team and advisory board are to:

- Provide more biking and walking infrastructure.
  - Take steps to make walking and bicycling safer and more pleasant (e.g., through intersection improvements, buffers between the road and bike lanes, traffic calming, signage, and other strategies).
  - Increase connectivity of pedestrian and bicycle infrastructure throughout the district and beyond.
  - Improve transit connections throughout the corridor.
  - Require new developments to enhance walkability (e.g., through mixed land uses).
  - Take active steps to attract development to the corridor.
- Encourage BRRC residents to walk through programs such as Safe Routes to School, walking clubs or Meetup groups, media campaigns, and other strategies.

For full report, please visit <http://www.healthimpactproject.org/hia/us/blue-ridge-road-corridor>