

Short Communication

How to Identify Human and Environmental Health Opportunities within Urban Communities?

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INTRODUCTION

Broadly defined, the urban built environment is part of the physical setting constructed by human activity [1]. The built environment within any community includes elements impacting human and environmental health. Such factors include healthy food availability, land use, distribution of activities, roads, sidewalks, and bike lanes [1]. Modifications to the built environment have a significant impact on human health. For example, the transformation of vacant green spaces and addition of bike lanes is associated with increased physical activity, decreased overweight populations, lower reports of depression, less reported alcohol abuse, and lower crime rates [2]. The same modifications to the built environment have been demonstrated to benefit environmental health by doing such things as reducing carbon emissions, absorbing pollutants, releasing oxygen, and providing clean air, water and soil [3]. A healthy built environment promoting human health works in tandem to improve environmental health.

Any locations void of fresh fruits and vegetables and other healthy whole foods are defined as food deserts [4], which are common in highly urban areas [5,6]. Individuals living in food deserts are more likely to have diet-related health problems, such as diabetes, cardiovascular disease, and overweight/obesity [7]. Vacant green spaces within urban communities can be transformed to serve many purposes, including community gardens which offer fresh fruits and vegetables. Community use of urban green spaces can provide multiple benefits to human and environmental health. Environments with more green spaces have been found to promote positive mental health and decrease mortality rates [8].

Safety and the connection to human and environmental health should be considered [5,6]. The presence of streetlights protects the safety of people walking and driving at night, and

reduces crime [9-11]. Sidewalks improve walkability and safety in communities [12,13]. Sidewalk access and safety have been a challenge among lower-income, highly urbanized communities [14]. "Bikeability" is another relative topic for urban communities. The use of bikes for transportation and exercise in an urban city can improve human and earth health. Bike lanes are important to physical activity, and the ability to bike is considered both a form of transportation and physical activity [15-17]. Bike lanes also assist in improving air quality by reducing chemical exposure [18].

The purpose of the current study was to observe attributes of the built environment along streets in select neighborhoods of an urban Midwestern city. These data highlight concerns and opportunities within an urban environment relative to human and environmental health. Factors important to community accessibility and safety were measured and descriptively reported.

METHODOLOGY

Four elementary schools in an urban Midwestern city were part of a community-based teacher education program from a Midwestern university. Faculty, students, and community members worked together to gain an understanding of urban issues and accomplish community goals. All data were observed. No IRB was required. Research assistants were trained to use a tailored built environment assessment and collected data on several occasions over the course of one academic year. Each school was located using Google Maps. All data were collected by foot, bike, and/or car from streets within a 1-mile radius surrounding each elementary school campus. Each school's spatial data were further subdivided into approximately ¼ miles of streets within the one-mile radius surrounding each school. All streets within each radius were then observed. Descriptive data were collected by walking each ¼ mile segment and observing each side of the street.

Measures and Descriptive Analysis

Data collected included accessibility to fresh fruits and vegetables, presence of sidewalks/streetlights/bike lanes, the opportunity for physical activity, and available green space. Fresh fruit and vegetable accessibility was observed and counted from all accessible establishments for each ¼ mile street that provided any fresh fruit or vegetable (i.e., supermarket, gas station, and convenience store). For safety, the presence of sidewalks (yes or no), streetlights (yes or no), and bike lanes (yes or no) were also recorded for each street. The percentage of each safety variable was calculated overall and for each school.

Physical activity was observed for both indoor and outdoor opportunities, which were counted for each ¼ mile street. Indoor activities were observed for any indoor pool or gym availability. Outside physical activities counted included availability to a beach/body of water, playground/park, sport or track field, or outdoor pool. Green spaces were defined as a vacant residential lot or an unused, open natural space. The number of available green spaces were counted for each street ¼ mile street.

RESULTS

Table 1 shows the frequency of certain characteristics of each ¼ mile street. These data are descriptive and informative. Overall, data suggests a lack of accessibility to fresh fruit and vegetables for the 1-mile area surrounding all schools. Of the 86 streets and 655 businesses observed, only 24 offered one fresh fruit or vegetable, which was only typically available from a grocery store or a gas station with low quality options. The safety variables observed included the presence of sidewalks, streetlights, and bike lanes. Descriptively, there were minimal differences between the four school environments on all safety variables. For the streets surrounding all schools, 78% had sidewalks, 85% had working streetlights, and 9% offered bike lanes. Relative to the environment, over 85 green spaces were observed with many having potential for community use.

DISCUSSION

The current study examined the physical environment of a Midwestern urban city. The purpose was to describe the availability and accessibility to a healthy community environment surrounding four elementary schools. Among the venues observed, data suggested a lack of accessibility to fresh fruits and vegetables for the 1-mile surrounding the four schools. This demonstrates a need and an opportunity for these establishments to add fresh fruit and vegetable offerings to their stores. There

is a strong association between the availability/accessibility of fruit and vegetables and consumption [19]. Future research and program efforts are needed to provide walkable access to healthy foods in urban environments.

Overall, the urban areas observed offered opportunities for safe, outdoor physical activity. Although areas provided physical activity opportunities, most streets did not include bike lanes. Utilizing outdoor space for exercise such as jogging and biking provides free and healthy forms of exercise. Noyes and colleagues [20], examined the use of bicycle lanes in a low-income urban neighborhood. Compared to other residents, cyclists reported healthier behaviors and overall better health. Bike lanes need to be considered in urban city development. This will support safer active transportation and improve health by providing physical activity opportunities.

Finally, the urban areas observed offered outstanding opportunities for modifying existing vacant green spaces. Over 85 green spaces were observed, with many having potential for community use. For instance, green spaces can be transformed into outdoor gyms, parks, courts, and other recreational activities. Transforming a vacant green space into a community garden can mitigate food poverty, increase social interaction, support culture, reduce stress and improve overall well-being and quality of life [21].

A limitation of the current study was observing each 1/4th mile rather than using exact coordinates. The methodology used in this study could be advanced by recognizing a more precise approach to observing the physical environment. Geographic Information Systems (GIS) technology is a more valid method to identify exact locations within the community. GIS use has been increasing in the identification of food deserts and can also be used to measure walkability in communities [22,23].

Urban communities need to be better understood and appreciated for the opportunities they provide for increased human and environmental health. The current study provides general information about specific city areas, providing a basic understanding of urban environments. Future research should consider mapping areas in communities and the vicinity of schools using GIS technology. The observations of current community areas were completed by researchers, undergraduate students, and community members. This community approach should continue; however, the advancements of GIS can also be used to provide more accurate data and less potential for human error. In conclusion, while urban environments include challenges, these

Table 1: Health Behavior Accessibility, Safety, and Environment Variables Observed each One-Fourth Mile

School	¼ Mile Streets Observed	Fruit and Vegetable Opportunities			Physical Activity Opportunities				Sidewalks	Streetlights	Bike Lanes	Number of Green Spaces			
		0	1	2+	0	1	2	3+				0	1	2	3+
1	22	130	5	0	119	10	2	1	76%	86%	7%	164	11	8	1
2	21	174	7	0	158	18	2	1	76%	87%	8%	205	7	4	3
3	21	207	6	0	176	29	4	4	81%	83%	10%	206	13	3	1
4	22	144	2	0	119	26	1	1	81%	84%	10%	180	16	4	2
Total	86	655	20	0	572	83	9	7	78%	85%	9%	755	47	19	7

communities also provide many opportunities to improve both human and environmental health. Future research is needed to both measure and optimize the potential for developing healthy urban communities.

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