Short communication

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Identifying human and environmental health opportunities within urban communities

Abstract

The purpose of the current study was to observe attributes of the built environment along all throughfares surrounding four elementary schools within an urban Midwestern city. Data highlight barriers and opportunities related to human and environmental health. Research assistants observed all thoroughfare within a one-mile radius surrounding each school. All data were collected by foot, bike, or car. Community accessibility and safety attributes were recorded and descriptively reported. Overall, data suggest a lack of accessibility to fresh fruit and vegetables. Descriptively, there were minimal differences between the four school environments on all safety variables. For the thoroughfares surrounding all schools, 78% had sidewalks, 85% had working streetlights, and 9% offered bike lanes. Over 85 unused green spaces were observed with potential for community use. Urbanization offers a strategic opportunity to design communities that actively promote both human well-being and environmental sustainability. Future research should employ Geographic Information Systems (GIS) to systematically map community areas and school vicinities. This approach enables precise spatial analysis, facilitating the identification of environmental factors influencing public health and education.

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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, 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.[3] 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.[2] 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 multiple 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.[9,10] Sidewalks improve walkability and safety in communities.[11,12] Sidewalk access and safety have been a challenge among lower-income, highly urbanized communities.[13] "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.[14-16] Bike lanes also assist in improving air quality by reducing chemical exposure.[17]

The purpose of the current study was to observe attributes of the built environment along thoroughfares 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 related barriers and opportunities for healthy behavior. All data were observed. No IRB was required.

To evaluate health-promoting features in urban communities, research assistants (N=15) were trained to employ a customized environmental assessment tool. This tool was used to systematically observe all throughfares within a 1-mile radius of four elementary school campuses. Throughfare was operationalized as any passage open at both ends that facilitated movement between two places, including streets, roads, drives, highways, and interstates. Data collection focused on ¼-mile segments (approximately 400 meters) of each thoroughfare, aligning with the commonly accepted "pedestrian shed" distance that represents a 5-minute walk—the typical distance individuals are willing to walk to transit stops. Observations were conducted on both sides of each thoroughfare, utilizing walking, bikes or cars. Inter-rater reliability was assessed by comparing observations from research assistants to those of the principal investigator, designated as the gold standard. Analysis of 10% of thoroughfare segments revealed inter-rater agreement that exceeded 85%.

Measures and descriptive Analysis

For each segment, researchers documented the availability of fresh fruits and vegetables, the presence of sidewalks, streetlights, and bike

lanes, opportunities for physical activity, and existing green spaces. Fresh fruit and vegetable accessibility was observed and counted from all accessible establishments 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 thoroughfare. Physical activity was observed for both indoor and outdoor opportunities. Indoor activities were observed for any indoor pool or gym availability. Outside physical activities 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.

Results

Table 1 presents the distribution of specific environmental attributes across each ¼-mile thoroughfare segment. The data indicate a notable deficiency in access to fresh fruits and vegetables within the 1-mile radius encompassing all surveyed schools. Along the 86 thoroughfares and 655 venues observed, only 24 establishments provided at least one fresh fruit or vegetable.

Table 1 Fruit and Vegetable Availability, Physical Activity Opportunity, Safety Attributes and Green Spaces on ¼-Mile Thoroughfare Segments Surrounding Four Elementary Schools

School	Number of ¼-mile segments	Number of fruit and vegetables available		Number of physical activity opportunities			Side* walks	Street-lights*	Bike lanes*	Number of green spaces		
		0	1	0	1	2 or more				0	1	2 or more
1	22	130	5	119	10	3	76%	86%	7%	164	11	9
2	21	174	7	158	18	3	76%	87%	8%	205	7	7
3	21	207	6	176	29	8	81%	83%	10%	206	13	4
4	22	144	2	119	26	2	81%	84%	10%	180	16	6
Total	86	655	20	572	83	16	78%	85%	9%	755	47	26

*Percentages indicate the proportion of thoroughfare segments possessing the specified attribute.

Safety-related variables (i.e., presence of sidewalks, streetlights, and bike lanes) exhibited minimal variation between the four elementary school environments. Collectively, 78% of the thoroughfares surrounding all schools were equipped with sidewalks, 85% featured operational streetlights, and 9% provided bike lanes.

Regarding environmental features, over 85 green spaces were identified alongside thoroughfares that possessed potential for community utilization.

Discussion

The current study examined the built physical environment of an urban Midwestern city. The purpose was to describe the availability of healthy community attributes within the environments surrounding four elementary schools. Results showed a lack of fresh fruits and vegetable accessibility along thoroughfares surrounding the four schools. Fruit and vegetable accessibility is strongly associated with youth consumption.[18] Increased access to affordable fresh fruit and vegetable options within community stores will support community health and enhance economic opportunities. Further research and programmatic initiatives are imperative to enhance walkable access to nutritious foods within urban settings.

Overall, the urban areas observed offered opportunities for safe, outdoor physical activity; however, 91% of the observed thoroughfares to these opportunities did not provide bike lanes. Utilizing outdoor space for physical activities such as jogging and biking provides a cost-free form of exercise. Noyes and colleagues[19] examined the use of bicycle lanes in a low-income urban neighborhood. Compared to other residents, cyclists reported healthier behaviors and overall better health. Integrating dedicated bike lanes into urban development plans is crucial for enhancing active transportation safety and public health.

Finally, the urban areas observed present significant opportunities for enhancing community health and environmental quality through the transformation of existing vacant green spaces. More than 85 green spaces were identified with suitability for community-oriented developments like outdoor gyms, parks, sports courts, and other recreational facilities. 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.[20] Converted green spaces significantly reduced feelings of depression and worthlessness among Philadelphia residents,[21] and improved biodiversity, air quality, and public satisfaction in South Korean urban areas.[22] Implementing similar strategies in the observed urban city could lead to improved well-being and quality of life for residents.

A limitation of the current study was recording healthy opportunities for each ¼th mile thoroughfare segment rather than using exact location coordinates. The current methodology should be refined by adopting more precise techniques for observing the physical environment. Utilizing Geographic Information Systems (GIS) technology offers a robust method for accurately identifying specific locations within a community. GIS enables the integration and analysis of spatial data, facilitating a comprehensive understanding of environmental factors influencing public health and education. GIS has become instrumental in the identification of food deserts and can also be used to access community walkability.[23,24]

Urban communities offer significant opportunities to enhance both human well-being and environmental health. By integrating green spaces, promoting active transportation, and implementing sustainable urban planning, these areas can improve residents' quality of life and foster ecological balance. Current outcomes provide general information about specific city areas and urban environments. Future research should consider mapping areas in urban communities alongside community leaders, teachers, students, and other salient community members. This community approach coupled with advancements of GIS will optimize the development of urban areas that promote comprehensive health.[25-33]

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