



## Page Avenue health impact assessment: Building on diverse partnerships and evidence to promote a healthy community

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### ABSTRACT

The Page Avenue health impact assessment (HIA) was focused on a redevelopment in Missouri. This case study describes a comprehensive HIA led by an interdisciplinary academic team with community partners, as well as compliance with North American HIA Practice Standards. Some of the key lessons learned included: (1) interdisciplinary teams are valuable but they require flexibility and organization; (2) engaging community stakeholders and decision-makers prior to, during, and following the HIA is critical to a successful HIA; and (3) HIA teams should not be too closely affiliated with decision-makers. It is hoped that this case study will inform future HIAs.

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## 1. Background

### 1.1. Introduction to health impact assessment

Creating environments that promote health can play a significant role in reducing rates of chronic diseases and unintentional injuries, leading causes of death and disability in the United States and internationally (Mokdad et al., 2004). The link between economic, physical, and social environments and health outcomes is widely recognized (CSDH, 2008). Moreover, it is increasingly understood that inequitable distribution of these conditions across various populations (e.g., racial minority and low income) is a significant contributor to persistent and pervasive health disparities (Berkman and Kawachi, 2000). The use of available science to support effective public health action reflects a long public health tradition (e.g., introduction of childhood vaccination, fluoridation of community water supplies, and improved public health interventions to control the risk factors for heart disease and stroke). Yet, for health and its range of determinants

to be improved by evidence-based decision-making, the public health sector needs to inform policies and decisions made by sectors outside of the traditional realm of public health and health care, such as planning, transportation, and housing (Collins and Koplan, 2009). These sectors are responsible for making decisions about community environments that may support or create barriers to healthy living.

Health impact assessment (HIA) is one tool to support evidence-based decision-making among non-health sectors. HIA is a combination of procedures, methods, and tools by which a policy, program, or project may be judged as to its potential effects on the health of a population and the distribution of those effects within the population (European Centre for Health Policy, 1999). HIA seeks to provide decision-makers with information to mitigate the negative and maximize the positive impacts on health and health inequities (Davenport et al., 2006). Performed during the planning stages of a policy or program, an HIA results in recommendations for modifications to improve health outcomes.

HIA is in use in a number of settings internationally (Cole et al., 2005) and particularly well-developed in Europe; however, the practice is just emerging as a field in other parts of the world, including the US (Cole et al., 2005; Dannenberg et al., 2006). HIAs around the world share common principles (e.g., democracy, equity, comprehensive approach to health, intersectoral, support for participatory decision-making, evidence-based); however, the methods and products of HIAs vary considerably, attributed to

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different politico-environmental contexts, projects or policies examined, resources, and other factors (Mindell et al., 2008; North American HIA Practice Standards Working Group et al., 2010). The roles of community engagement, partnerships, and dissemination modes have proven difficult to operationalize, and significant variation exists in the methods used to estimate health impacts. In an effort to advance HIA practice in North America, leaders of HIA practice in North America recently developed “minimum elements” that constitute an HIA and “practice standards” to serve as guidelines for best practice (North American HIA Practice Standards Working Group, 2009; North American HIA Practice Standards Working Group et al., 2010). These standards align with the international core principles and processes of HIAs described in the World Health Organization’s 1999 Gothenburg Consensus Paper on HIA (European Centre for Health Policy, 1999). How the standards are applied in practice requires further examination, especially in different contexts across the US.

## 1.2. Overview of Page Avenue HIA

The Page Avenue HIA was a comprehensive, prospective HIA that was initiated and conducted by a team of faculty, staff, and students from St. Louis, Missouri area universities, with community stakeholder participation. Unlike European HIAs, which are almost always done by or in coordination with government agencies, the Page Avenue HIA was carried out by non-governmental organizations, a more typical practice of US HIAs. Thus, it lacks the full backing of resources from government agencies, but at the same time was less constrained. Because this HIA was conducted outside of normal government processes, its findings are advisory.

The Page Avenue HIA represents the first known HIA to be carried out in the central Midwest. The focus was a redevelopment being planned along a major thoroughfare through Pagedale, Missouri, an inner-ring suburb within metropolitan St. Louis. The redevelopment is located in a predominantly African American (85%), low-income community (24% below poverty level) with limited access to places for physical activity and healthy foods (U.S. Census Bureau, 2009; Baker et al., 2006). Following an extensive decision-making process involving many stakeholders and community input, Beyond Housing, the non-profit lead developer, and consultants devised a redevelopment plan that was approved in 2007 as a Tax-Increment Financing (TIF) District. A TIF district is a tool that uses future tax revenue to offset the costs of current improvements that will create that revenue. TIF is designed to channel funding toward improvements in blighted areas where development might not otherwise occur. Representing the focus of the Page Avenue HIA, the redevelopment plan included building a new grocery store, followed by commercial and mixed-income residential redevelopment and infrastructure improvements on a four-block stretch of Page Avenue, one of the primary commercial districts in this region of St. Louis County. The purpose of the TIF district was to stimulate economic development, one of six major goals outlined in the 2001 Pagedale Community Action Plan, created in partnership between the City of Pagedale and Beyond Housing, with the assistance of St. Louis County. The population anticipated to be affected by the redevelopment included current and future residents of the City of Pagedale ( $n \sim 3600$ ) as well as surrounding communities ( $n \sim 18,000$ ; U.S. Census 2000). Boundaries of the affected area were selected based on local knowledge and ease of defining boundaries using zip codes, municipality borders, and major arterials.

The primary goal of the Page Avenue HIA was to influence project plans to improve safety, walkability, and access to

recreational facilities and healthy foods for families and youth. Other objectives were to increase awareness among regional decision-makers and stakeholders regarding the many factors that impact health and to facilitate cross-sectoral partnerships aimed at promoting health.

This paper represents a case study of the Page Avenue HIA conducted between April 2009 and September 2010. The purposes of the paper are to (1) describe the process (screening, scoping, assessment and developing recommendations, reporting, and monitoring) of completing a comprehensive HIA led by an interdisciplinary academic team with community partners and (2) discuss lessons learned and unexpected outcomes. In addition, compliance with the North American HIA practice standards (North American HIA Practice Standards Working Group et al., 2010) is discussed, including identification of standards that were challenging, infeasible, or inapplicable.

## 2. HIA methodology

### 2.1. Overview of committees and decision-makers

Given unfamiliarity with the term “HIA” and its rigid or technical connotations among community stakeholders and the decision-makers, the HIA team chose to refer to the HIA by a different name—the Healthy PAGE Project, with PAGE standing for Policies and Actions Guided by Evidence. The Healthy PAGE Project team (hereafter, core team) was composed of an interdisciplinary team of nine university-affiliated faculty and staff within the fields of public health, urban design, public policy, social and economic capacity building, active living research, participatory research, and community engagement. The core team also included a representative from Beyond Housing. The lead developer of the Page Avenue redevelopment was the non-profit organization Beyond Housing, one of the region’s leading providers of housing and support services for low-income families and homeowners. Other key decision-makers included the city council of Pagedale, Missouri Department of Transportation, and St. Louis County government (Planning, Health, Economic Development, and Executive’s Office). The roles and involvement of these and other individuals and organizations are described in Table 1.

Many members of the team had worked across sectors in the St. Louis region and brought a strong understanding of the political, social and physical landscape of this region. Working relationships and trust with decision-makers, community leaders, and organizations had been established by the team prior to initiation of the HIA. Beyond Housing had been working with the City of Pagedale as part of its comprehensive place-based efforts since 2001. Washington University established its presence and partnership in Pagedale through working with Beyond Housing to direct a matched savings program for the poor; organizing a streetscape improvement program with residents, volunteers and students; and design/build studio projects by architecture students which resulted in the construction of an art pavilion in a neighborhood playground. These initiatives that brought about concrete programs and physical improvements to the community fostered respect and trust between Beyond Housing and the City of Pagedale, community residents, and the academic core team. At the same time, the core team itself had no history of working together prior to the HIA. The team was formed based on similar interests, previous involvement in the community, and strong support and encouragement by university leaders for interdisciplinary initiatives and community–university partnerships.

**Table 1**  
Groups involved in the Page Avenue HIA.

Group	Members	Roles	Meeting frequency
Core Team	<ul style="list-style-type: none"> <li>● Five faculty members from three universities</li> <li>● Three staff</li> <li>● One representative from the non-profit decision-making organization</li> </ul> <p>Disciplines included</p> <ul style="list-style-type: none"> <li>● Architecture</li> <li>● Community development</li> <li>● Epidemiology</li> <li>● Behavioral science</li> <li>● Social work</li> <li>● Public policy</li> </ul>	<ul style="list-style-type: none"> <li>● Directed all aspects of the HIA process</li> <li>● Collected data and community input to inform evidence-based recommendations</li> <li>● Drafted recommendations</li> </ul>	Bi-weekly
Steering Committee	<p>Eight representatives from:</p> <ul style="list-style-type: none"> <li>● Community association</li> <li>● Community</li> <li>● Local church in redevelopment zone</li> <li>● School district</li> <li>● Regional health commission</li> <li>● University-extension community development program</li> <li>● Planning department of adjacent municipality in the study area</li> <li>● Non-profit decision-making organization</li> </ul>	<ul style="list-style-type: none"> <li>● Identified priority impacts of the redevelopment</li> <li>● Provided input and approval of the recommendations</li> </ul>	<p>Met five times:</p> <ol style="list-style-type: none"> <li>1. Orientation</li> <li>2. Overview of redevelopment, defining healthy community, and identifying health impacts;</li> <li>3. Reviewing evidence concerning community profile and pathways; eliciting requests for additional data/evidence;</li> <li>4. Presenting and eliciting input on impacts of alternative designs;</li> <li>5. Reviewing recommendations and report</li> </ol>
Advisory Committee	<p>Eight experts, mostly senior faculty, from fields of:</p> <ul style="list-style-type: none"> <li>● Public health</li> <li>● Economic development</li> <li>● Social work</li> <li>● Architecture</li> </ul>	<ul style="list-style-type: none"> <li>● Provided input on the early phases of the HIA</li> <li>● Reviewed the HIA report</li> </ul>	Varied, as needed
Community Residents	60 residents	<ul style="list-style-type: none"> <li>● Collected household survey data (n=10)</li> <li>● Provided community perspective on assessment findings and redevelopment impacts (n=50)</li> </ul>	Varied, as needed.
Students	<p>16 undergraduate and graduate students from:</p> <ul style="list-style-type: none"> <li>● Architecture</li> <li>● Public health</li> <li>● Social work</li> <li>● Communications</li> </ul>	<ul style="list-style-type: none"> <li>● Collected and analyzed data</li> <li>● Planned the community event</li> <li>● Created renderings of alternative redevelopment plans</li> <li>● Formatted the final report</li> </ul>	Varied, as needed
Lead developer (primary decision-maker)	Beyond Housing	<ul style="list-style-type: none"> <li>● Assisted with community outreach, recruitment of community members in information-gathering activities, and disseminating information to the community.</li> <li>● Provided information about the community, redevelopment plans and community events to facilitate the assessment activities of the HIA</li> </ul>	Bi-weekly with representative
Secondary decision-makers	<ul style="list-style-type: none"> <li>● City of Pagedale (mayor and city council)</li> <li>● St. Louis County—Health, Planning, Economic Development and Executive's office</li> <li>● Missouri Department of Transportation</li> <li>● East-West Gateway Council of Governments</li> </ul>	<ul style="list-style-type: none"> <li>● Participated in key informant interviews</li> <li>● Met with core team to discuss Page Avenue HIA findings</li> </ul>	Twice during year

## 2.2. Screening

Determining the value of conducting the Page Avenue HIA required several months of review and inquiry, but its value was ultimately decided by its synergy with concurrent initiatives in

the Pagedale community, as well as expressed support by the decision-maker. The idea of conducting an HIA originated with early discussions between Beyond Housing who requested the assistance of Washington University faculty to engage the community around the redevelopment. Significant time in the early

planning phases was dedicated to understanding how an HIA fit with the various university initiatives in the community. During the course of preliminary discussions and grant applications, it appeared that the screening criteria were met to proceed with the Page Avenue HIA (Table 2).

The Page Avenue HIA complied with HIA practice standards (North American HIA Practice Standards Working Group et al., 2010) for screening with one exception. The core team had not clearly identified all decision-alternatives under consideration by decision-makers at the HIA planning stage, as recommended in HIA practice standards. Although the project was defined, its programming elements, timing, and infrastructure plans were not solidified in part because it was a TIF district. These omissions contributed to some of the decisions made and challenges faced during the course of the HIA, as discussed later in this paper.

### 2.3. Scoping

Defining the scope for this HIA was a recurring activity throughout core team meetings. The core team frequently revisited roles, timelines, and methods and adapted as new information became available.

Identifying the key health impacts and pathways involved both the core team and the steering committee. Using an adapted toolkit (Institute of Public Health in Ireland, 2006), facilitated discussion and subsequent design process (described below), the steering committee identified the seven priority health impacts of the redevelopment: employment; access to goods, services, and recreation; access to healthy foods; pedestrian safety; community safety; community identity; and housing. Subsequently, these impacts were confirmed in key informant interviews and by the community residents in an open house break-out session. The priority impacts gave the core team an organizing framework for the assessment phase.

Another key activity during the scoping phase of HIAs involves providing opportunities for stakeholder input, for example receiving public comment on the scoping findings and interviewing stakeholders and experts. The core team felt that community input was a priority. Therefore, with the help of undergraduate and graduate students, a community “open house” was held in the Pagedale City Hall. The purpose was to confirm the priority impacts as well as gather additional evidence about the impacts, therefore serving as both a scoping and assessment tool. The open house was publicized using signs in local businesses, a community newsletter, and flyers sent home with schoolchildren from local public schools.

Both food and childcare were provided. Forty residents attended the event where the lead developer presented the redevelopment plans and answered questions. Community assessment data primarily around the seven priority impacts were presented in the form of colorful, interactive posters. Resident input on the key impacts was gathered in break-out sessions. In addition to this open house, expert opinion was elicited through structured interviews with 21 area experts/decision-makers.

The Page Avenue HIA deviated slightly from HIA practice standards for the scoping phase in three ways. First, some assessment activities occurred simultaneously with the scoping phase (e.g., household survey, focus groups). Gathering community input was a high priority, but took time to plan for and gather. Because the HIA was university-initiated rather than resident-initiated, considerable effort was invested in identifying and contacting potential stakeholders to serve on a steering committee, and planning community engagement activities. In addition, consideration of “all potential pathways that could reasonably link implementation decisions to health whether direct, indirect, or cumulative,” as stated in the practice standards (North American HIA Practice Standards Working Group et al., 2010), was difficult in the early phases of the HIA given the comprehensive nature of the redevelopment, some uncertainties associated with the plan, and desire to incorporate stakeholder input. Although the HIA standards state that the impacts should be focused on those possessing the “greatest potential significance with regards to: magnitude, certainty, permanence, stakeholder priorities, and equity,” the Page Avenue HIA instead focused on all seven priority impacts selected by the steering committee and compared their impacts towards the end of the HIA process after assessment, rather than in the planning phase.

Second, because the affected community represented a homogeneously vulnerable minority population, equity issues were more of a concern at the regional level, not at the level of the immediate HIA impact area. The HIA team made an effort to assess the unique needs of area youth because qualitative assessments identified this group as having limited resources and amenities.

Third, a design process was adopted to stimulate discussion amongst the steering committee about design priorities for the redevelopment. The core team with architecture students developed alternative redevelopment options that emphasized various design emphases (e.g. open space vs. density). These design options were not treated as “alternative schemes” to be adopted, but rather as a means to compare health impacts and prioritize decision-making. The team found that incorporating design-thinking and

**Table 2**  
HIA screening criteria.

Criteria	How met in Page Avenue HIA
Potentially significant health effects	Potential health impacts of the redevelopment were significant and long-lasting given the current physical health and economic status of the population, as well as planned improvements to the infrastructure and economic vitality of this section of Page Avenue.
Added value	The Page Avenue HIA would contribute new information to the decision-makers about health impacts and alternative plans. The redevelopment plan addressed economic development and service disparities; however, health priorities such as physical activity and healthy eating had not been considered.
Political opportunity	The results of the HIA would likely be valued by decision-makers who expressed interest in the HIA recommendations. Strong partnerships between these organizations and members of the core team had been established. In addition, the HIA had potential spillover effects on decision-making that was underway concerning the broader Normandy School District comprised of 24 municipalities, including the City of Pagedale.
Technical feasibility	The core team had sufficient data, resources, and multi-disciplinary expertise to carry out a comprehensive HIA. Washington University contributed funding to support the HIA planning and data collection (US\$60,000). Additional funding was secured from the Robert Wood Johnson Foundation's Active Living Research program (US\$150,000) to support faculty/staff time (including one staff), evaluation, and communication/dissemination materials.
Timing	The redevelopment project was in the planning and design phases and a one-year time frame was considered appropriate for conducting a comprehensive HIA. Moreover, the timing of the project and plans for the redevelopment provided a window of opportunity for influencing future decisions. Many aspects of the plan had yet to be defined which could influence health.
Well-defined project proposal	At the time the Page Avenue HIA was being considered, a plan for the TIF redevelopment district had been drafted.

professionals helped to facilitate visualization of the redevelopment issues, which in turn promoted discussion about health impacts and practical considerations of the HIA recommendations.

#### 2.4. Assessment and developing recommendations

A variety of quantitative and qualitative methods and data, such as household survey data, maps, focus groups, and scientific evidence, were triangulated to understand the affected population and how the redevelopment would impact health (Table 3). The comprehensive

nature of assessment and planned evaluation activities, with paid staff and financial incentives for participation, contributed in part to the relatively high costs of this HIA (presented in Table 2). Some assessment activities that involved original data collection were conducted only in Pagedale because they built on existing initiatives (e.g., household survey) or were used to assess accessibility of the area immediately surrounding the redevelopment (e.g., bus stop and sidewalk audits). Other assessment activities were carried out for the entire affected area (e.g., mapping, Open House, Steering Committee, and key informant interviews). Findings from these assessments were

**Table 3**  
Overview of assessment methods for the Page Avenue HIA.

Assessment method	Study population/setting	Content
Household survey	City of Pagedale ( $n=155$ of 453 sampled households participated)	121 questions from the following categories: <ul style="list-style-type: none"> <li>● Personal safety</li> <li>● Neighborhood security</li> <li>● Community trust</li> <li>● Physical activity</li> <li>● Shopping for food and eating out</li> <li>● Diet</li> <li>● Personal health</li> <li>● Employment</li> <li>● Wages and income</li> <li>● Assets</li> <li>● Community engagement and involvement</li> <li>● Community concerns</li> <li>● Demographics</li> </ul>
Focus groups	18 Pagedale residents, by ward	<ul style="list-style-type: none"> <li>● Strengths and challenges related to physical activity, nutrition, physical infrastructure, and economic development that may be affected by the Page Avenue revitalization;</li> <li>● Planning, program, and policy issues of high priority for residents</li> <li>● Barriers community members face when trying to engage in the process of change</li> </ul>
Mapping	Page Avenue HIA study area	<ul style="list-style-type: none"> <li>● Locations of food outlets and financial institutions</li> </ul>
Food store audits	9 Pagedale food stores	<ul style="list-style-type: none"> <li>● Availability of healthy food options</li> </ul>
Sidewalk audits	64 street blocks around Page Avenue redevelopment	<ul style="list-style-type: none"> <li>● Conditions of sidewalks and roads, physical disorder for mapping</li> </ul>
Bus stop inventory	45 bus stops in Pagedale	<ul style="list-style-type: none"> <li>● Sidewalk conditions</li> <li>● Presence of shelter or shade</li> <li>● Level of comfort provided</li> <li>● Daily level of ridership</li> </ul>
Steering committee meetings	8 community stakeholders and experts	<ul style="list-style-type: none"> <li>● Identified priority impacts of the redevelopment</li> <li>● Provided input on and approval of the recommendations</li> </ul>
Open house on April 26, 2010	40 residents of the Page Avenue HIA study area, mostly representing older and retired residents despite promotion of event to parents of area youth.	<ul style="list-style-type: none"> <li>● Shared the TIF redevelopment plan with residents and to provide an opportunity for questions with the lead developer</li> <li>● Displayed the results of the research that had community participation, including the household survey and focus groups</li> <li>● Presented how the redevelopment could affect the quality of life for residents</li> <li>● Gathered feedback on the redevelopment's potential impacts</li> </ul>
Key informant interviews	21 decision-makers involved in either the redevelopment of Page Avenue or the affected region of the St. Louis County	<ul style="list-style-type: none"> <li>● Baseline knowledge and priorities concerning the Page Avenue redevelopment</li> <li>● Perceived health impacts of the redevelopment</li> <li>● Perspectives on the well-being of residents</li> <li>● Perceived challenges with implementing the redevelopment</li> </ul>
Archival data	Page Avenue HIA study area	<ul style="list-style-type: none"> <li>● Sociodemographic, economic, and health indicators of the affected population</li> </ul>
Research studies and evidence-based reviews	Not applicable	<ul style="list-style-type: none"> <li>● Scientific studies in the form of systematic reviews and individual studies informed the predictions of health impacts of the redevelopment</li> </ul>

**Table 4**  
 The following *Impact Table* summarizes the direction and likelihood of the effects of the Page Avenue redevelopment, as well as the top five health impact assessment (HIA) recommendations, on each of the priority impacts. The likelihood of the effects was based on the strength of supporting evidence, as explained in the key. An estimate of the population impact of the redevelopment and recommendations are provided at the bottom of the table. These estimates were determined by the expected reach of the proposed change on the community or at-risk populations, as well as the likelihood of impact.

- Key:**
- **+ or – signs** indicate the **direction** of the impact, where + is the potentially beneficial impact; – is the potentially harmful impact; and 0 is the no known or significant impact.
  - The **number of signs** indicates the **likelihood** of the impact based on the strength of evidence supporting the relationship between the current redevelopment plan or recommendation and the priority impact (or associated longer-term health consequences).
    - 1 sign is the speculative. The impacts are supported by expert opinion such as the Healthy PAGE team or key informant decision-maker.
    - 2 signs are the probable. The impacts are supported by community stakeholder input and/or individual scientific studies. These boxes are highlighted in gray.
    - 3 signs are the definite. The impacts are based on multiple studies or scientific review(s) and supported by community stakeholders. These boxes are highlighted in gray.
  - The estimates of the **community health impact** of the redevelopment and recommendations at the bottom of the table are based on (1) expected reach of the proposed change on the community or at-risk populations and (2) the likelihood of impact on health across all of the priority impacts.

Priority impact	Current Page Ave redevelopment plan Conditions that minimize the likelihood of positive health impacts	Five top recommendations from Page Avenue HIA				
		#1: Replace symbols of disinvestment and improve pedestrian infrastructure in the short-term	#2: Implement orchards and gardens	#3: Supplement physical improvements with education and programming	#4: Prioritize spaces and programs for youth recreation	#5: Foster stakeholder engagement
<b>Employment</b> <i>Lower risk of morbidity and premature death</i>	+ Local employment opportunities will be improved	+ Investment in infrastructure may help attract businesses which could lead to more and earlier employment opportunities	+ Incorporating the Fruit Hill initiative into a marketing plan may help attract businesses with employment opportunities	++ Providing information about job training and job application may increase the chances that residents are qualified and knowledgeable about job opportunities	++ Youth programs may improve youth job readiness	+ A chamber of commerce could maintain communication among local businesses and work with developer on strategies for attracting new businesses
<b>Access to goods, services and recreation</b> <i>Physical activity, obesity, alcohol-related harms, wealth, and health events associated with access to health care services</i>	++ The redevelopment will improve access to goods and services within walking distance of most residences <i>Attracting businesses can be challenging in this region, and no known policies are planned for the TIF district to limit businesses associated with negative health impacts</i>	+++ Investment in infrastructure may help attract businesses that provide goods and services to the community. Improved connectivity and accessibility of businesses will likely support multiple forms of physical activity	+ Incorporating the Fruit Hill initiative into a marketing plan may help attract businesses that provide goods and services to the community	0	++ Improving access to recreational opportunities may contribute to increased physical activity levels and healthy weight among youth, a currently underserved population at high-risk of obesity based on current health trends	+ A chamber of commerce could maintain communication among local businesses and work with the developer on strategies for attracting new businesses
<b>Access to healthy foods</b> <i>Healthy eating, obesity, chronic disease</i>	++ The new grocery store will increase the proximity to and options for affordable healthy food for all residents <i>There is no guarantee that residents will eat healthier or patronize the new store or that the store will sell a variety of healthy options</i>	0	++ Planting gardens and orchards represent promising strategies for increasing fruit and vegetable intake and awareness of healthy eating among participants and patrons	++ Serving healthy foods at meetings, offering cooking and nutrition classes, and posting signs to promote healthy food choices can encourage healthy eating beyond improved access	0	++ The success of gardens and orchards will depend on local leadership, volunteers, and skill-building opportunities for participants
<b>Pedestrian safety</b> <i>Physical activity, obesity, chronic disease, pedestrian injuries/death</i>	++ Pedestrian improvements are planned for the redevelopment <i>The timing and extent of improvements to pedestrian infrastructure along this thoroughfare are unknown</i>	+++ Prioritizing pedestrian infrastructure improvements in the short-term will likely improve safety and increase physical activity in the area surrounding the new grocery store	0	+++ Publicizing and offering more walking clubs can improve physical activity levels beyond physical improvements to pedestrian environment	0	+ Creating a task force of stakeholders to advocate for walkability may increase the likelihood that these pedestrian infrastructure improvements are implemented

<p><b>Community safety</b> Stress, anxiety, poor mental health, chronic disease, physical activity and obesity</p>	<p>+</p> <p>New homes and businesses may increase pedestrian activity which could improve the natural surveillance of the area. Mixed-income housing may promote social cohesion and thus safety. No known policies are planned for the TIF district to limit establishments associated with high crime (e.g., bars)</p>	<p>++</p> <p>Replacing boarded up buildings and poor street lighting will help remedy environmental conditions that support crime</p>	<p>+</p> <p>Having more users on the street at varying times of day and throughout the day increases surveillance (eyes on the street) and is associated with reduced incidence of crime. Orchards and gardens may improve social activity on the street and contribute in part to improved surveillance</p>	<p>0</p>	<p>+++</p> <p>Communities with high levels of social control and cohesion have lower levels of crime and improved perceptions of safety</p>
<p><b>Community identity</b> Mental and physical health, lower risk of premature death</p>	<p>+</p> <p>Opportunities to strengthen community identity are likely. There are no known plans for marketing the community or for remediate the empty lots or poorly maintained buildings that affect community identity</p>	<p>++</p> <p>Replacing boarded up and deteriorating buildings and improving infrastructure may improve and sustain community morale and perceptions</p>	<p>++</p> <p>Incorporating the Fruit Hill initiative, planting orchards and gardens, and creating public space in empty lots could enhance the character of the street and promote community and social engagement</p>	<p>0</p>	<p>++</p> <p>Beyond Housing's existing programs to promote homeownership, maintenance and repair will continue to help improve and sustain healthy housing in the community</p>
<p><b>Healthy housing</b> Asthma, cancer, unintentional injuries, cardiovascular disease, arthritis, poor sleep, mental health</p>	<p>++</p> <p>The redevelopment will increase the number of homeowners, provide senior housing, replace older homes on Page Avenue, and possibly increase property values. Current plans separate market-rate and affordable housing and do not specify the design and management of individual units</p>	<p>-</p> <p>Approximately 15–20 additional residents on Page Avenue will need to be relocated. However, it is likely that Beyond Housing will fairly compensate them</p>	<p>0</p>	<p>0</p>	<p>0</p>
<p><b>Overall impact on community health</b></p>	<p><b>High</b> if successfully implemented as planned</p>	<p><b>High</b> Implementing this recommendation would likely benefit the entire community, and changes are positively associated with multiple priority impacts</p>	<p><b>Moderate</b> Gardens and orchards may improve the health of a subset of the population (participants). Their implementation is positively associated with multiple priority impacts; however their feasibility and effects on the success of the redevelopment are mostly speculative</p>	<p><b>Moderate</b> Providing educational opportunities and programs benefits a subset of the population (participants) yet capitalizes on physical improvements of the redevelopment to enhance population level health</p>	<p><b>Moderate</b> Stakeholder engagement may increase the likelihood that the redevelopment will improve priority impacts. Community engagement and social capital are independently associated with many positive health outcomes. It is unknown to what extent stakeholders can organize and influence decisions</p>

provided throughout the report under their relevant topics. The Page Avenue HIA report was organized by the seven priority impacts including discussion about (1) how that impact (i.e., health determinant) is connected to health; (2) what was learned from the community about the priority impact; (3) opportunities the redevelopment presents to maximize positive health outcomes (i.e., estimated effects of the redevelopment on the priority impact); and (4) recommendations. In addition, several overarching and cross-cutting issues were identified and discussed separately (e.g., stakeholder engagement, phasing, youth). Similar to many HIAs, estimated health impacts of the redevelopment were based solely on qualitative assessments (Dannenberg et al., 2008).

Overall, there was consensus across the core team, stakeholders, and decision-makers that the redevelopment would positively impact the health of the community. However, because of concerns about prolonged phasing or lack of detail in the current plan, some priority impacts were more certain (access to goods, services, and recreation; access to healthy foods; housing) than others (employment, pedestrian safety, community safety, community identity). The only potential negative impacts concerned relocation of people's homes and businesses. Both businesses and homeowners had been and would be fairly compensated, rendering negative impacts minimal in light of many anticipated benefits. The possibility of gentrification was not a concern for this relatively small redevelopment given the tough economic and social issues faced in this region.

Despite the many predicted positive impacts of the redevelopment, there were limitations, challenges, and opportunities associated with the redevelopment's capacity to improve community health and well-being. For example, the developer faced significant obstacles to recruiting investors to this community, so the uncertainty of seeing the redevelopment materialize in a timely manner was acknowledged and the effects of delay in businesses locating to the community (e.g., temporary vacant lots) were examined in the HIA. As another example, bringing a grocery store to a low-income community represents a tremendous achievement and dedication to the community; however, building a grocery store does not guarantee healthier eating among area residents. Physical improvements are important but limited in their capacity to positively affect health-related outcomes and therefore require supplementation with programming and education. The Page Avenue HIA included 50 recommendations developed by the core team with steering committee input. They were organized by priority impact area to address the challenges, limitations, and opportunities of the redevelopment with the goal of maximizing positive health outcomes. Each recommendation was further organized by strategy (i.e., policy, design, program, or education), directed to a specific decision-making body, and assigned a source to promote transparency.

Recognizing the need for brevity to facilitate retention and guide priority-setting, the core team developed five "top recommendations," representing common themes that emerged from the assessment of each priority impact, as well as a separate assessment of leading challenges and opportunities concerning the redevelopment and larger area. The rationale and meaning of these recommendations are discussed more fully in the HIA report. While the determination of significance, direction, and certainty of the redevelopment impacts were described qualitatively in the report by priority impact, the team felt the report needed a way to clearly document the predicted impacts of the redevelopment plan and five top recommendations. A matrix was created that succinctly documented the relationships with the priority impacts, along with a summary of overall impact on community health (Table 4).

The Page Avenue HIA strived to comply with HIA practice standards for assessment and developing recommendations.

Notably, the "developing recommendations" step did not become its own step in the practice standards until the 2010 Practice Standards were released in November 2010 (North American HIA Practice Standards Working Group et al., 2010), after the Page Avenue HIA was completed. Having originally followed the 2009 Practice Standards (North American HIA Practice Standards Working Group, 2009), the team combined these steps when implementing the HIA and in discussing this case study. In general, the assessment resulted in rich data but was resource- and time-intensive, and more detailed information was collected than the HIA team chose to include in the HIA report (although all materials were referenced and made available on CD-ROM and in companion reports). A "reality" of this HIA was that the core team, comprised predominately of researchers, possessed high expectations for gathering multiple forms of data to profile the community. Often, obtaining human subjects approval and collecting and analyzing data competed with time needed for other important HIA activities (planning for community engagement and communicating with the decision-makers). Human subjects approval was granted for all original data collection involving community residents. In developing the recommendations, the core team, with input from the steering committee and Beyond Housing representative, strived to make the recommendations specific, feasible, enforceable, and directed to specific decision-makers. The team sought expert guidance; however in hindsight, the team should have engaged transportation decision-makers and experts earlier in a more deliberate way as discussed later.

## 2.5. Reporting

Two versions of the Page Avenue HIA Report were disseminated: (1) a full report (125 p.) with executive summary mailed or hand-delivered to 24 key decision-makers and (2) an executive summary (10 p.) mailed to eight other regional decision-makers, planners, and community stakeholders. Drafts were reviewed by the steering committee, consultants, and advisors. Both documents were intended to be visually appealing and easy to navigate. The final HIA report was also made publicly accessible at the Healthy PAGE webpage (<http://prcstl.wustl.edu/research/Pages/HealthyPAGE.aspx>). More importantly, the core team held in-person meetings with seven groups of decision-makers to disseminate and discuss the findings. The team decided that individual meetings were optimal for ease of scheduling, tailoring recommendations, and allowing decision-makers to independently react to the report. The tailored conversations with the seven groups of decision-makers (23 individuals in total) were mostly well-received. Each meeting identified ways the organization was involved in improving health in the community, summarized the HIA process, discussed recommendations directed to that organization, and suggested potential partnerships that could leverage efforts. In addition, residents were informed about the HIA findings via a community newsletter sent to 800 households and a booth (with activities for youth and healthy prizes) at a back-to-school event.

The core team complied with the vast majority of the practice standards for reporting. Although the report was reviewed by the steering committee and five experts from diverse backgrounds, as suggested in the practice standards, the report was not reviewed by decision-makers until it was nearly final. The major reason for not obtaining feedback earlier was lack of time. The HIA practice standards focus mostly on guidelines for written reports and summaries. The Page Avenue HIA went beyond simply creating a report and involved meeting with decision-makers, an important activity that lacks documentation concerning implementation and outcome in HIA practice.



## 2.6. Monitoring

Whether the Page Avenue HIA was effective in changing project plans, cross-sector collaboration between organizations and agencies, or citizen involvement in planning will not be realized for some time. Although a general monitoring plan for the Page Avenue HIA was developed and baseline priorities for the redevelopment were collected via structured interviews with decision-makers, it was not possible to monitor the outcomes of the HIA during the one-year HIA period. Therefore, reflections on compliance with HIA practice standards are not described here. Yet, some immediate reactions on other impacts of the HIA can be discussed. During individual meetings, transportation and planning decision-makers became more aware of the redevelopment and Beyond Housing's leadership in this community, and they provided verbal commitments to improve sidewalks near transit stops, as well as offered technical assistance to Beyond Housing and the City of Pagedale for the infrastructure improvements. Both the County Health Department and Pagedale mayor committed a staff person and city council member, respectively, to participate on a post-HIA task force. Moreover, local knowledge of HIAs likely increased as a result of the Page Avenue HIA. Only one of 21 key informants had knowledge of HIAs prior to receiving notification of the Page Avenue HIA.

To date, the core team believes the Page Avenue HIA made the following impacts, some of which were unintended, positive consequences that emerged from the HIA process, prior to delivery of the HIA report:

- raised awareness of health impacts of policy decisions among the decision-makers who participated in our HIA, specifically local and regional government staff;
- raised awareness about HIAs among university affiliates, as well as local and regional decision-makers;
- connected decision-makers from different sectors and organizations to address issues related to infrastructure improvements in the redevelopment area;
- instigated a city initiative to revive and embrace fruit orchards and gardens that emerged from Pagedale leadership in response to thinking about healthy eating during the course of the HIA. One of the core team members and her graduate students are helping to bring it to fruition;
- contributed new methods and tools for assessing baseline priorities and perceptions of community well-being and health impacts of the redevelopment among decision-makers prior to delivery of the HIA findings;
- increased access to information about the community to community residents;
- contributed data to support community planning efforts;
- set an example for how a design process can be utilized for HIA recommendations;
- served as a model for formatting and displaying visually appealing information and findings in an HIA report.

Opportunities to build and expand the efforts of the HIA exist as part of a separate initiative being launched following the Page Avenue HIA. The "24:1 Initiative" is a community-building effort under the leadership of Beyond Housing to unify and engage the 24 municipalities that make up the Normandy School District boundaries, with the vision of "strong communities, engaged families, successful children." Pagedale, where most of the HIA efforts were focused, is one of the 24 municipalities in this diverse region of St. Louis County that is challenged by decades of disinvestment. Community health and wellness makes up one

of eight focus areas, and the social, economic, and environmental determinants of health behaviors (e.g., physical activity, diet) are readily present in this committee's discussions and goals. A task force is currently exploring how to incorporate the data and findings from the Page Avenue HIA into this larger initiative. Community stakeholders and other leaders have expressed interest in sustaining the work of the HIA.

## 3. Discussion

While conducting the first HIA in the central Midwest, the interdisciplinary team built on existing partnerships and trust to carry out a comprehensive HIA. The team was successful in integrating multiple forms of evidence and perspectives to deliver a visually appealing report and present findings in person to decision-makers from multiple sectors. Many of the enabling factors associated with the conduct of HIAs and integration with decision-making environment were present (Davenport et al., 2006). Although the project and affected community were relatively small, the value of HIA should not be underestimated because it had the potential to influence future initiatives, cross-sector collaborations, and inform similar, individually small proposals. Despite its successes and strengths, the team experienced some challenges and identified many lessons learned to inform future comprehensive HIAs. The following describes the challenges of three overarching issues (working with a large interdisciplinary team; maximizing and sustaining partnerships and community participation; and complex relationships with key decision-makers) encountered by the team while carrying out the Page Avenue HIA. An overarching discussion and summary of lessons learned for each issue follow.

### 3.1. Working with a large interdisciplinary team

Conducting an HIA with a team of nine university-affiliated members in addition to multiple other collaborators was beneficial for integrating multiple viewpoints, experiences, and methodologies but also challenging from a logistical and conceptual/methodological standpoint. In addition, the associated faculty/staff time costs (including one full-time staff) associated with undertaking this interdisciplinary and participatory HIA with plans for evaluation are not typical expenses in other HIA practice settings. On a positive note, the entire Page Avenue core team participated in an in-person HIA training with an outside expert, prior to initiating the HIA, which ensured team members were "on the same page" in terms of the purpose and steps of the HIA once the project was funded. In addition, the team hired a full-time project manager to coordinate day-to-day HIA operations and organized into sub-groups for assessment activities. Yet, from a logistics standpoint, the core team often lacked sufficient time for structured, conceptual discussions regarding disciplinary approaches to objectives, methods and collaboration. The core team discovered that they may have missed an opportunity for more strategic planning, especially as it related to community engagement, during the early HIA training, prior to grant funding. Often meetings focused on near-term actions. A galvanizing factor was that members had good knowledge of the political landscape and maintained positive rapport when overcoming differences. They also wished the HIA to be useful to this community; however, since the team was not responding directly to stakeholder requests, the definition of useful was somewhat abstract. This posed problems from the standpoint of identifying priorities for resource and time allocation, and to some degree, what the overall purpose of the HIA was intended to be. In addition, when drafting the report, it became clear that the interdisciplinary team

shared different understandings of what constituted “evidence” (personal experience vs. data-driven) when profiling the community and estimating health impacts. Outside evaluation of the HIA process needs to occur; however, preliminarily it appears that the team differences were mediated and resulted in a report that reflects the interdisciplinary nature of the team and embraces transparency in the source of observations and recommendations.

Involving undergraduate and graduate students proved to be mutually beneficial for the core team and students. Sixteen paid students from public health, communication, architecture/urban planning, and social work participated in various capacities of assessment, community engagement and reporting, and in turn gained valuable experience working with interdisciplinary teams, community-based research and practice, and communication of data to lay audiences.

The following summarizes the lessons learned as a result of working with a large interdisciplinary team:

- Researcher and practitioners who are new to HIA should take time to become educated about HIAs by reading the literature, talking to HIA experts, and participating in formal HIA training.
- Interdisciplinary HIA teams have the potential to contribute new methods and knowledge. Significant time should be invested early on in the HIA process for conceptual discussions regarding disciplinary approaches to objectives, methods and collaboration.
- An organized, yet flexible approach to defining objectives and process is required when involving large diverse teams and community stakeholders. Flexibility is required to ensure that community input is incorporated and sufficient discussion is permitted to develop actionable recommendations.
- Students contribute valuable insight and energy, and HIAs provide enriched curricular experiences.

### 3.2. Maximizing and sustaining partnerships and community participation

Community participation is a core value in HIA practice (European Centre for Health Policy, 1999). It helps identify problems and solutions hidden by experts, makes the process more democratic and transparent, generates a sense that health and decision-making is community-owned, and creates the buy-in necessary for effective policy implementation (Dannenberg et al., 2008; European Centre for Health Policy, 1999; Wright et al., 2005). Yet, information on the nature and extent of community involvement is poorly reported in HIA practice (Davenport et al., 2006), and community participation and empowerment in HIA has proven difficult to operationalize (Wright et al., 2005). As experienced by others (Wright et al., 2005), the core team found it difficult to involve community residents who were not already engaged in community activities and struggled with knowing what constituted legitimate participation. Moreover, the extensive time required to involve the community may have had a negative impact on the quality and frequency of communication with high-level decision-makers—important for ensuring that the HIA was fitting their needs. Despite many efforts to avoid anticipated low participation (e.g., publicizing, providing food, flexible scheduling), the core team faced challenges in community engagement including recruiting residents for focus groups; fluctuating attendance at steering committee meetings; and lower-than-expected attendance at a community open house. Fostering relationships and interaction takes time, which is why HIAs that build on existing partnerships may be ideal, particularly HIAs of smaller scaled policies and projects. The degree of successful engagement experienced by the Page Avenue HIA was attributed to previous connections in the community and help from the non-

profit organization with a positive reputation and relationship with the community.

With the exception of the Eastern Neighborhoods Community HIA in San Francisco, HIA practice in the US tends toward one-time assessment with little guidance on how to institutionalize the practice, sustain community engagement and cross-sector partnerships. In the case of the Page Avenue HIA, community-university partnerships have the potential to build on and create new and sustained cross-sector partnerships for maximal impact, but this depends, in part, on the nature and extent of future commitments. Relationships and partnerships with decision-makers are fragile. Care must be taken to think beyond the HIA for continued community participation and decision-maker engagement to optimize the outcomes of the HIA.

The following summarizes the lessons learned about maximizing and sustaining community participation:

- The HIA process itself can influence and inform community-level partnerships and policies prior to delivery of the final report. Involvement of community residents, stakeholders, and decision-makers in the process of identifying key impacts and recommendations will likely have a greater impact on decision-making and perceptions of healthy communities, than the final written report alone.
- HIAs may have the greatest likelihood of success of engaging community stakeholders within the time constraints of the policy-making process if they build on existing partnerships.
- Community engagement is more likely to be successful when prioritized and planned from the beginning.
- Mechanisms should be created to sustain the partnerships and momentum after HIA findings are delivered.

### 3.3. Complex relationships with key decision-makers

Decision-maker ownership and HIA credibility represent important enablers to integrating HIA findings into the decision-making process (Davenport et al., 2006). In the early stages of the Page Avenue HIA, the core team cited in theory that a compelling aspect to this HIA was the active involvement and commitment of the primary decision-makers for the project (Beyond Housing and the City of Pagedale) and an established relationship with many of the players, a factor that has contributed to successful HIAs in the US (Dannenberg et al., 2008). Such links have been said to be more important than rigorous quantitative data in the HIA report. Yet, this assumption, in practice, turned out to be somewhat of a hindrance at various points in the process. The fact that there were concurrent partnerships between the university, Beyond Housing and the City of Pagedale, and that Beyond Housing was anticipating the launch of the 24:1 Initiative, created the need to be sensitive to how the leadership of Beyond Housing and Pagedale felt that they were being portrayed by the HIA and the team, and whether or not either would be criticized in the end. The team's ability to be a neutral third party was somewhat compromised by this dynamic. The core team strived to strike a balance between maintaining impartiality and objectivity to achieve integrity of the HIA findings and involving the leading decision-maker in the HIA process. Yet, additional communication with the primary decision-maker, as well as with representatives from transportation and planning, may have resulted in improved decision-maker ownership, value, and credibility of the HIA.

Representing another challenge associated with the Page Avenue HIA was the fact that the university initiated this HIA as opposed to it growing out of stakeholder demand. This made it more open to criticism that it was quite literally an academic exercise, in spite of the team's great effort to engage stakeholders into the process. The engagement that occurred throughout the

process did ignite grass-roots leadership and potentially could create more momentum in the future.

The following summarizes lessons learned related to complex relationships with key decision-makers:

- An HIA team should not be too closely affiliated with the decision-makers to avoid compromising important partnerships and to ensure maximum freedom and objectivity regarding recommendations.
- Academic groups should think carefully about how an HIA will be perceived by decision-makers when choosing whether to initiate versus support an HIA.
- Decision-makers should consistently be involved in the HIA process in a structured and intentional way.
- The HIA process can identify potential alliances and help to broker partnerships between seemingly disparate actors; however, good knowledge of the political environment is essential.

#### 4. Conclusions

HIA represents a promising evidence-based tool for placing health at the table when decisions are being made across sectors about projects and policies that are likely to affect health and address disparities. Case studies like the one presented here are important for building up the evidence concerning the value and practice of HIA in the US. It is hoped that the Page Avenue HIA will inform future comprehensive and interdisciplinary HIAs by highlighting steps taken to comply with HIA practice standards, as well as the benefits and challenges associated with HIA partnerships and working with large interdisciplinary teams. Success of the Page Avenue HIA and other HIAs will ultimately be determined by their ability to impact decision-making and contribute to sustainable and healthy environments among diverse populations and settings.

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