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DOI: 10.1377/hlthaff.2014.0661
 HEALTH AFFAIRS 33,
 NO. 11 (2014): 1914–1922
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 The People-to-People Health
 Foundation, Inc.

Case Study: San Francisco's Use Of Neighborhood Indicators To Encourage Healthy Urban Development

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ABSTRACT Neighborhood indicators are quantitative measures of neighborhood quality, including measures of attributes such as crime, noise, proximity to parks, transit services, social capital, and student performance. In 2007 the San Francisco Department of Public Health, with broad public input, developed a comprehensive system of neighborhood indicators to inform, influence, and monitor decisions made by the Department of City Planning and other community development institutions. Local public agencies, businesses, and citizens' groups used the indicators to identify disparities in environmental and social conditions, inform and shape neighborhood land use plans, select appropriate sites for development projects, craft new environmental regulations, and justify demands on developers to make financial contributions to community infrastructure. Among other things, the use of indicators contributed to policies to prevent residential displacement, a city ordinance requiring stricter building ventilation standards in areas with high air pollution, and the redeployment of traffic police to high-injury corridors. Data that can be used to create neighborhood indicators are increasingly available, and participation by public health and health care institutions in the indicators' development, dissemination, and application could help improve several conditions that contribute to poor population health.

Many attributes of neighborhoods—including sufficiency of housing, accessibility of supermarkets and parks, exposure to environmental emissions, and degree of social cohesion—affect residents' chances for having optimal health.^{1,2} Improving positive attributes and abating harmful ones require the efforts and collaboration of multiple public- and private-sector entities. But first, a community needs a way to define and measure goals and monitor progress.

Social indicators are measures that assess progress toward addressing social priorities. The indicators can be used to draw attention

to problems, focus action, encourage collaboration, and monitor results.³ Neighborhood indicators, a subset of social indicators, measure the physical and social characteristics of a place. For example, a neighborhood indicator could be the crime rate, the level of noise, the frequency of transit service, or the proximity to or size of parks. Because neighborhood indicators are proxies for several determinants of health, they can be used to promote population health.

Neighborhood indicators have several uses in urban planning and community development. Indicators identify neighborhoods and neighborhood attributes that need improvement. Institutions responsible for urban planning and

economic or community development can then use indicators to guide the selection, location, and design of infrastructure and programmatic investments to address these needs. Indicators serve a monitoring function prospectively, and institutions can use them to trigger course corrections when a program or investment does not result in the expected progress.

Because neighborhood indicators often measure conditions that multiple institutions affect, their use may also help coordinate action. By using neighborhood indicators to expose factors responsible for poor health, proponents of population health might be able to motivate responsible public and private institutions to improve neighborhood conditions.

Involving citizens in the selection of indicators helps ensure their relevance and utility.^{4,5} Neighborhood indicators enable citizens to participate more knowledgeably in decisions that affect their own living and working conditions. Citizens can also use indicators to define or establish public priorities and to monitor progress toward improving prioritized neighborhood conditions.

In 2007 the San Francisco Department of Public Health, working with multiple public agencies and over thirty local organizations, developed a system of neighborhood indicators to evaluate how well decisions about land use planning met the needs and achieved the objectives of population health.^{6,7} Subsequently, citizens, community organizations, government agencies, and private businesses used these indicators to shape neighborhood land use plans, locate infrastructure investments, craft new land use regulations, and negotiate community benefits with developers.

This article provides a case study of San Francisco's experience with neighborhood indicators, describing applications of the indicators to community design and development. The account is based on my experience and observations as the director of the design, development, and application of the indicators in San Francisco between 2007 and 2013. I describe applications of neighborhood indicators in five areas: land use planning, the design of development projects, environmental regulations, public safety programs, and community engagement. I then reflect on which attributes of indicators contribute to their utility and where there are opportunities to use them for health promotion.

The Development Of Neighborhood Indicators

The impetus for developing neighborhood indicators grew out of efforts by the San Francisco

Department of Public Health to respond to critiques by community residents of local land use and planning practices. According to these critiques, city planners had focused exclusively on the reuse of industrial zones for market-rate housing, which risked displacing low-income working families.⁸ Planners, many community members argued, were not considering residents' needs and priorities, including their needs for basic neighborhood infrastructure such as parks, schools, and libraries. Many community members were concerned that plans did not anticipate environmental hazards that would result from the location of new housing in industrial areas.

In 2003, to respond to community critiques, the Department of Public Health began conducting health impact assessments (HIAs) to analyze and make recommendations for individual land use development projects.⁹ In several cases, communicating the results of these HIAs to planners or testifying about them to the city's Planning Commission legitimized community concerns and triggered changes in development projects.¹⁰

For example, the department conducted one HIA on a proposal to demolish an apartment building to make way for a condominium tower. The HIA provided evidence of the negative health impacts of involuntary displacement, which resulted in planners' requiring that the developer build replacement housing for the apartment building's tenants.

HIAs were effective in several cases. However, some planners and residents objected to the department's use of an HIA to raise concerns at a late stage in the development process.

In 2004, looking for a more proactive way to engage development interests, the Department of Public Health convened a public-private partnership, called the Eastern Neighborhoods Community Health Impact Assessment, to evaluate the health impacts of land use plans in four of San Francisco's mixed-use urban neighborhoods: the Mission District, East SoMa (South of Market), Showplace Square, and Potrero Hill, collectively known as the Eastern Neighborhoods.⁶ The plans called for repurposing underused industrial land for higher-density residential development.

The department invited all city agencies with roles in land use or neighborhood quality and over forty private organizations to participate as stakeholders. Through a facilitated consensus-building process, stakeholders examined the potential impacts of proposed growth patterns on community health. Evidence and research collected by the department informed these deliberations. Participants identified and recommended policy and practice solutions to

mitigate the negative consequences of development.

In the context of this eighteen-month process, community stakeholders asked the department to create a yardstick that could be used both to evaluate proposed land use plans and to monitor prospectively the success of planning agencies in creating healthy communities. The department decided to create a system of indicators to meet this need.

The design and development of neighborhood indicators for San Francisco have been fully described in several other publications.⁶⁻⁸ Briefly, applying lessons from previous experiences with neighborhood indicators,^{10,11} the Department of Public Health sought candidate measures that were relevant to community interests; could be disaggregated by neighborhood; represented conditions with effects on health; and could be applied to land use decisions, planning, and policies. Developing indicators that were comparable across all city neighborhoods was important to improving planners' assessments of existing

conditions and to identifying environmental disparities across neighborhoods. The department vetted the candidate measures with community and public agency stakeholders as well as additional national experts and advisers and ultimately decided on a final list of indicators.

It was not technically possible to disaggregate all of the measures in the final list by neighborhood. The department included several indicators measured at the city scale—for example, the wage rates of various occupations—both because of community interest in these measures and because of their usefulness in providing context for other indicators.

The department did not combine the indicators to create a summary measure of neighborhood quality for two reasons. First, doing so might obscure discrete and solvable problems. And second, individual indicators might be more meaningful and motivating.¹²

Selected examples of San Francisco's neighborhood indicators are listed in Exhibit 1. The current neighborhood indicators for San Fran-

EXHIBIT 1

Selected San Francisco Neighborhood Indicators

Domain	Indicator
Housing	Proportion of renter households whose gross rent is 50% or more of their household income Proportion of households living in dwellings with one person or fewer per habitable room Number of dwelling units per acre Number of health, habitability, and building code violations
Transportation	Proportion of households without access to a motor vehicle Number of severe and fatal traffic injuries annually per 100 road miles Annual average miles of vehicle travel per square kilometer per day
Economy	Employment rate Jobs per square mile Number of local businesses owned by minorities or women
Education	Number of children ages 0-14 per available position in a licensed or family child care center Average age-adjusted child care costs as a share of the median household income School Academic Performance Index ^a
Public realm	Proportion of the population within a half-mile of a public library Proportion of the population within a quarter-mile of a public recreational facility Number of street trees per road mile Number of supermarkets, produce stores, and farmers markets that accept Supplemental Nutrition Assistance Program (SNAP) benefits electronically
Health systems	Annual age-adjusted rate of preventable hospitalizations Percent of women receiving prenatal care in their first trimester of pregnancy
Community cohesion	Annual number of reported violent crimes per 1,000 people Proportion of the population who feel safe walking alone in their neighborhoods Number of outlets selling liquor for off-site consumption per square mile Proportion of registered voters who voted in the last congressional election
Environment	Annual per capita residential electricity use in kilowatt hours Proportion of the population living where the concentration of particulate matter smaller than 2.5 microns is greater than 10 micrograms per cubic meter Percent of the population living where the average twenty-four-hour noise level is above 60 decibels

SOURCE Author's analysis of San Francisco Indicator Project (Note 13 in text). ^aCalifornia Department of Education. County list of schools: 2010 Base Academic Performance Index (API) report [Internet]. Sacramento (CA): The Department; 2012 Jun 27 [cited 2014 Oct 15]. Available from: http://api.cde.ca.gov/Acct2011/2010Base_Co.aspx?cselect=38,San,Francisco.

cisco, along with their data sources and maps illustrating how indicators vary across city neighborhoods, are available on the Department of Public Health's indicator website.¹³

To translate the indicators into an evaluation tool for planning, the department also produced a checklist of development targets. Similar in structure to the Leadership in Energy and Environmental Design (LEED) instrument for the assessment of green building designs, the Healthy Development Checklist¹⁴ included targets for a project's location, design, and community benefits.

A project's achievement of a development target functioned as a proxy for the project's making a positive health contribution to the neighborhood or avoiding negative impacts. For example, development targets for the housing domain included a minimum level of residential density, a minimum share of dwellings with two and three bedrooms, a minimum level of affordability for a proportion of housing units, and an enhanced standard of ventilation compared to the existing building standards (Exhibit 2).

The Department of Public Health anticipated that the voluntary use of the development checklist might encourage developers to consider design elements that promote health and take steps to improve their projects' community health performance.

Neighborhood Planning

In 2007 the department applied the neighborhood indicators and the development checklist to the four San Francisco neighborhoods that were the subject of the assessment described above.⁷ As mentioned, the planners had been confronting various community concerns in course of the planning process. The department used the indicators and the checklist to provide qualitative estimates of the likely effects of the draft plans on each of the neighborhood indicators. On the basis of this analysis, the department provided the planners with detailed recommendations for plan revisions to improve the indicators. The planners and department staff then discussed the recommended changes.

This first application of the indicators and development targets led to substantive changes in the Eastern Neighborhoods' land use plans. For example, the planners added a requirement that developers conduct additional analyses of noise exposures when residential projects were proposed in locations with relatively high levels of noise. To prevent residents' involuntary displacement, the plans included new policy language discouraging any development that required demolishing existing affordable hous-

ing. The Eastern Neighborhoods' plans also authorized a new social impact fee on developments to fund infrastructure improvements, such as community recreational centers and playgrounds.

The planners did not adopt all of the department's recommendations. For example, the department's analysis indicated that increasing development in the Eastern Neighborhoods would create significant new risks for pedestrian injuries and deaths, primarily because the former industrial and commercial neighborhoods contained busy, multilane streets.¹⁵ The Department of Public Health recommended changes to streets to reduce and slow traffic in new residential areas. The planners did not dispute these safety impacts. However, planners resisted making significant changes to existing city streets in their plans, considering such street design modifications to be politically and fiscally infeasible.

Similarly, the planners did not adopt recommendations to set aside land for new urban schools. The planners argued that schools would not serve the demographic section of the population that would buy the new housing and that school capacity was available in nearby neighborhoods.

The public commissions of both the Department of Public Health and the Department of City Planning endorsed this first application of the new neighborhood indicators. Staff of both agencies subsequently applied them to several other neighborhood land use plans.

A planning process for the Western SoMa neighborhood provided another opportunity to apply the indicators. The city's Board of Supervisors appointed a community planning task

EXHIBIT 2

Selected Healthy Development Targets For Affordable, Safe, And Adequate Housing In San Francisco

Target

At least 20 percent of units are affordable housing.

At least 25 percent of units have two bedrooms and at least another 25 percent have three bedrooms.

There are at least twenty-five units per residential acre, or at least forty units per residential acre for projects half a mile or less from regional mass transit stops.

If the project results in the demolition or loss of permanently affordable, public, inclusionary, or rent-controlled housing, it replaces the demolished or lost housing stock at a 1:1 ratio and provides access to replacement housing for existing tenants at existing rents.

The project provides mechanical ventilation that is consistent with standard 62.6 of ASHRAE (formerly the American Society of Heating, Refrigerating, and Air Conditioning Engineers).

SOURCE Author's analysis of San Francisco Indicator Project, Healthy development checklist (Note 14 in text).

force to draft the plan for this neighborhood. Many task force members opposed maximizing density and wanted new neighborhood investment to improve transportation and public infrastructure while preserving the neighborhood's scale and character.

Task force members relied heavily on the neighborhood indicators in assessing the neighborhood's physical infrastructure needs, and the adopted plan included policies to enhance neighborhood quality and limit negative environmental impacts. For example, new zoning rules restricted the consolidation of building lots into large parcels, enhanced requirements for open space, prohibited new driveways on pedestrian streets, and mandated a minimum number of two- and three-bedroom dwellings. The plan also called for a new network of neighborhood streets, restrictions on traffic in residential alleys, and requirements for businesses to minimize their emissions of noise, fumes, and light.¹⁶

Project Design And Development

Land use plans dictate how land is used and provide standards for buildings' size and design. However, developers of individual projects still have the discretion to select project locations and make several design decisions. The land use plans adopted in the Eastern Neighborhoods called on planners and developers to use the development checklist voluntarily to maximize the beneficial impacts of individual development projects implemented in these neighborhoods. This recommendation was an explicit policy of the adopted land use plans. However, the Department of Public Health was never able to secure the wide adoption of the development checklist by developers or to ensure its routine use by planners in reviewing development projects.

Outside the context of the Eastern Neighborhoods' planning process, however, several private developers voluntarily used the indicators and the checklist to help guide project siting and design decisions. For example, some developers sought advice from department professionals on how to manage the environmental hazards described in indicators related to air pollution, noise levels, and pedestrian injuries. This consultation resulted in changes to some projects' designs, such as changes in the physical orientation of projects to reduce exposure to environmental emissions and the reservation of building space for community services.

One national nonprofit organization, the Trust for Public Land, used neighborhood indicators to inform the design of park renovations that were intended to improve community access

Task force members relied heavily on the neighborhood indicators in assessing physical infrastructure needs.

and physical activity.¹⁷ Specifically, environmental quality and safety indicators informed the location of facilities such as playgrounds and trails within park sites.

Environmental Regulation

One purpose of land use regulations is to protect people from health and safety hazards. Zoning rules, for example, commonly require a safe physical distance between hazardous industrial land uses and residences and schools. Fine-grained information on pollution levels and the location of emission sources is often necessary to develop and implement environmentally protective land use rules.

The neighborhood indicators included new block-level measures of particulate matter, cancer risk, and traffic noise as well as new intersection-level measures of access to schools, parks, and public transit. In some cases, the new information triggered regulatory responses under existing laws. The California Environmental Quality Act, for example, requires cities to identify, assess, and mitigate environmental harm and health hazards associated with development, including harms that result from bringing people to locations with existing environmental hazards.

Neighborhood indicators for pollution demonstrated that some of the new housing allowed by the plans would be in close proximity to busy roadways and would have unacceptable health risks because of air pollution.¹⁸ Because restricting the location of housing was in conflict with the city's growth objectives, the Department of Public Health proposed that developers install mechanical ventilation and filtration in locations with significant outdoor air pollution. In 2008 the city formalized this approach through an ordinance that used the neighborhood air pollution indicators to trigger higher building ventilation standards.¹⁹

Neighborhood indicators are a resource for residents engaged in making community decisions.

Similarly, environmental indicators illustrated how proposed plans would result in new noise conflicts between residential and industrial uses. Noise levels in neighborhoods rezoned for new housing were generally higher than levels in existing residential neighborhoods because of commercial and industrial uses and busy arterial streets in the rezoned neighborhoods. Existing city regulations demanded lower noise levels for residential zones.

The conflict, which was illustrated by superimposing areas proposed for housing on maps of neighborhood indicators, identified a need to revise the city's noise regulations to respond to the greater proximity of commercial and residential uses. The Department of Public Health crafted new regulations that recognized the need for housing but sought to mitigate the harmful impacts of noise.²⁰ The department also used maps of the noise indicator to press for more active enforcement of existing building standards that required protecting indoor areas from ambient noise.

Public Safety Programs

Neighborhood indicators proved useful in monitoring and shaping citywide pedestrian safety programs after an executive directive of the mayor called for halving the frequency of serious and fatal pedestrian injuries in ten years.²¹ The city had historically allocated resources to pedestrian safety primarily in response to residents' complaints. New neighborhood-scale indicators of street and area pedestrian injury density demonstrated that over 50 percent of the serious and fatal injuries were concentrated on only 5 percent of streets. Furthermore, areas where the city was investing in improvements to slow—or “calm”—traffic were typically not the locations where most injuries occurred. As a result, the city re-deployed traffic police to the high-injury corridors and began to examine what new design technologies could be deployed to reduce speeds on busy arterial streets.²²

Civic Engagement

Neighborhood indicators are a resource not just for planners and government officials but also for residents engaged in making community decisions. To support community applications, the Department of Public Health conducted workshops to promote the indicators' use by community organizations, architects, and development professionals.

In San Francisco many of the community organizations whose representatives participated in the selection of the neighborhood indicators and in the workshops used the indicators in their activities related to planning and development issues.⁸ For example, residents of the East SoMa neighborhood argued that Rincon Hill—a neighborhood adjacent to East SoMa and recently zoned to allow multiple high-rise residential condominiums—should include a mix of affordable and market-rate housing and should set aside land for parks, schools, and community centers.

The city's Planning Commission did not fully address these concerns in approving a neighborhood land use plan for Rincon Hill. However, residents were able to negotiate directly with developers for community benefits, using neighborhood indicator maps as evidence of disparities in access to community infrastructure. Ultimately, developers and community organizations reached an agreement whereby developers paid an additional impact fee, to be used for affordable housing and other community infrastructure.²³

Lessons For The Use Of Neighborhood Indicators

In San Francisco, broadly representative public and agency participation was instrumental in selecting measures that were representative of community needs, widely understood, and useful for decision making and accountability. Collectively, stakeholders defined what counted as community health, prioritized issues for measurement, and directed the city's exploration of available data.⁶ According to an evaluation of the process, the quality of participation likely enhanced the interpretability, meaning, and relevance of indicators for stakeholders and contributed to the indicators' usefulness in supporting stakeholders' demands in the process of policy making.⁸

The Department of Public Health had anticipated that indicators measured at the neighborhood level would be well suited to the work of local city planners and organizations engaged in community advocacy.^{11,12} Data that are disaggregated spatially can reveal patterns of inequalities

in urban health, social conditions, environmental quality, and economic opportunity.¹ In San Francisco, maps of neighborhood indicators showed that both negative and positive attributes of neighborhoods were clustered together.

For example, the maps illustrated striking deficits of public resources such as parks, libraries, and schools in several of the neighborhoods with planned residential growth. These maps supported social and environmental justice arguments for investments in needed public resources.

The Department of Public Health developed a large number of neighborhood indicators, but it found only a select minority to be routinely useful. Individual indicators had value particularly when they provided evidence for advocacy for established community interests or served as measures to evaluate a public institution's compliance with its mandate.¹²

Indicators of pollution and other physical hazards were commonly used, perhaps because they most clearly conveyed health priorities and because environmental hazards are existing subjects of governmental regulation. The neighborhood scale of environmental hazard indicators also provided information that had not previously been available to planners.

Several indicators helped public institutions define and circumscribe problems and target solutions. For example, the air quality indicators illustrated that air pollution hot spots occurred in a limited band next to busy roadways. Similarly, pedestrian injury indicators illustrated that most serious injuries occurred on a minority of roadways, as mentioned above.

However, the Department of Public Health found many other indicators to have only limited value. Several may have been beyond the purview of urban planning and community development institutions. For example, planners could require dwellings in residential projects to include a specific number of bedrooms but had limited ability to affect employment opportunities or job quality. Some indicators may not have provided new information on well-understood problems, such as crime and violence. Other indicators may have had only limited relevance to community residents.

Importantly, neither the creation nor the application of indicators guaranteed solutions. In 2007, data alone did not allow the department to overcome the fiscal and political constraints that prevented it from protecting pedestrian safety. However, the indicators were useful tools for community advocates. By 2010, pedestrian safety advocates had convinced the mayor to convene the transportation, health, police, planning, and

The use of indicators has not had many public detractors—a fact that may reflect their perceived neutrality.

public works agencies to coordinate action on this issue.^{21,22}

Sustaining Initiatives Using The Indicators

The use of neighborhood indicators has never been formally institutionalized in San Francisco: No law or regulation requires that public agencies collect or use the indicators. However, the Department of Public Health has sustained the indicators initiative for seven years.

In this time period, neighborhood indicators have become day-to-day resources for planning agencies and community development stakeholders, as well as a way for the department to communicate the factors influencing health to residents, agency staff, and policy makers across institutional sectors. The department updates the indicators periodically, conducts trainings and workshops about them for community groups and building and design professionals, and continues to seek and support partnerships that use the indicators. The use of indicators has also not had many public detractors—a fact that may reflect their perceived neutrality and objectivity.

The Availability Of Data For Neighborhood Indicators

Data availability is often a challenge for neighborhood indicators. In San Francisco, developing neighborhood indicators that were responsive to stakeholders' interests and the needs of city planners for useful information required original data collection and analysis. For example, estimating the concentration of fine particulate matter and levels of noise required the application of computer simulation models.

Several of the most compelling neighborhood indicators were new composite measures that integrated multiple data sources. For example,

Neighborhood indicators could help health care systems plan community and population health initiatives.

a novel elementary school score combined measures of school proximity, residential density, and school academic performance.

Data for neighborhood indicators projects are increasingly available. Several cities have comprehensive systems of the indicators that are comparable to the system in San Francisco. Boston, Massachusetts,²⁴ and Baltimore, Maryland,²⁵ for example, have well-developed systems.

Open-data proponents, who advocate for governments and businesses to make data freely available and accessible, are also increasing the range of neighborhood indicators. Real estate data firms such as Zillow and Trulia have already exploited open-data resources to provide consumers with comparable information on neighborhood quality, including measures of crime rates, retail service availability, transit accessibility, and school performance.²⁶

Satellite imagery is now providing a ready measure of tree cover across the globe.²⁷ The ability to sense air, sound, light, and other ambient environmental qualities through mobile devices is creating additional opportunities to assess neighborhood-level environmental qualities efficiently.²⁸

Other Uses Of Neighborhood Indicators

The value of neighborhood indicators for population health extends beyond the urban development and community planning applications described above.¹¹ For example, when the San Francisco Bay Area Metropolitan Transportation Commission was developing its latest regional transportation plan, it selected indicators related to pollution, walkability, and safety and funded discretionary transportation projects in part based on their impacts on these indicators.²⁹ Similarly, any public or private agency that provides funds or incentives for housing, transportation, or community development could use the indicators to target and prioritize investments.

Neighborhood indicators could also help health care systems plan community and population health initiatives. Regional health care institutions could examine the relationship between neighborhood indicators and the avoidable use of health care and could use the relevant data to target prevention programs to specific neighborhood risk factors or to specific neighborhoods.

Conclusion

This case study illustrates how a public health agency used neighborhood indicators to inform and influence decisions about local urban planning and community development. Broad public and agency participation and data at the neighborhood scale were instrumental in developing indicators that were useful and had an impact. Data that can be used to create neighborhood indicators are increasingly available, and participation by public health and health care institutions in the development, dissemination, and application of these indicators may be a way to improve several conditions that contribute to poor population health. ■

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