MEASURING HEALTH IN LEED

Representation of health and well-being within U.S. Green Building Council LEED 2009 rating systems

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> "... there is an opportunity for green buildings to move past the premise of 'do no harm' to a focus on holistic health promotion."

Introduction

In 2012, the U.S. Green Building Council (USGBC), the Robert Wood Johnson Foundation (RWJF), and the University of Virginia School of Medicine formed a "Green Health" partnership[1] focused on leveraging the market transformation capacity of green building to accelerate innovation and translation of built environment and health research within the real estate industry. One goal of this on-going collaboration is to increase use and availability of health-focused design credits within green building certification systems, such as USGBC's widely used Leadership in Energy and Environmental Design (LEED) platform. Towards this end, this current study aims to a) identify and inventory health-focused credits across each of the LEED subsystems and b) analyze the existing "representation" of health within LEED by examining the language used to describe health-related issues in both the credit intent library and accompanying resource materials. Results of this analysis will help inter-disciplinary stakeholders more easily identify and use currently available health-related credits within LEED and facilitate discussions regarding potential future directions for its development with regard to the development of expanded health-related resources.

Background

Features of our built environments at multiple spatial scales, such as stair design, accessibility of sidewalks, parks, and supermarkets, play a proven role in determining critical health behaviors[2], such as rates of daily physical activity[3-7] and dietary choices.[8,9] As a result, there is increasing focus within the medical and public health communities on improving the design of the built environment as an important strategy for health promotion.[10-14] Two examples include the prominent discussion of the built environment in the U.S. National Prevention Strategy[15], the primary blueprint for health prevention policy across federal agencies, and the Robert Wood Johnson Foundation's *Commission to Build a Healthier America*.[16]

There is also increasing demand within the design community, from architecture to urban planning, for more robust and sophisticated approaches to connecting building design and operation with demonstrable public health outcomes. This is exemplified by robust health and the built environment initiatives launched by several prominent design advocacy groups including the American Institute of Architects, the U.S. Green Building Council, and the Urban Land Institute.

Accelerating progress towards access to healthy places for all will require an increased focus on the development of practice-based tools and strategies. The majority of built environment and health research to date has focused primarily on establishing associations between environmental design and health behaviors.[17] However, tools to facilitate consideration of health within on-the-ground decision-making by architects, urban planners, developers, and other stakeholders within the real estate industry remain underdeveloped.[17]

In this study, we explore ways in which green building certification frameworks, such as the LEED rating system developed by USGBC, can provide platforms for

translating public health research into practice. Over the last 20 years, USGBC has leveraged innovations such as LEED to drive innovation and practice. The LEED framework certifies and distinguishes a building or neighborhood project based on achieving a certain number of intent-based prerequisites and credits. The demonstrated market value of achieving LEED certification – particularly at its higher levels, i.e. Silver, Gold, Platinum – has helped to incentivize the creation of thousands of homes, schools, and commercial buildings of all types that save energy, reduce water use, and provide superior environmental conditions.[18]

Health and well-being are long-standing values of the green building movement, but health outcomes have not been as formally or intentionally addressed within green building tools as concerns such as energy efficiency or natural-resource conversation. Today, it is challenging for practitioners, such as architects and real estate developers, to target improved health outcomes using the LEED framework, in part because it is unclear what health issues LEED intends to address and which specific strategies aim to prioritize health. This lack of clarity creates a barrier to more fully integrating public health evidence, frameworks, and approaches into green building tools. This study takes a first step in breaking down that barrier by providing a baseline inventory of health-related intentions and language in LEED 2009.

Methods

We conducted a systematic review of LEED 2009 documentation including rating systems and reference guides describing 419 prerequisites and credits in seven major rating systems, including LEED for New Construction (NC), Existing Buildings (EB), Core and Shell (CS), Commercial Interiors (CI), Healthcare (HC), Schools (S), and Neighborhood Development (ND). The review was conducted by manually analyzing each rating system and reference guide. A LEED rating system is comprised of text describing the credit intent and requirements while a LEED reference guide provides additional information on how to achieve the credit as well as the benefits of the designated strategy. We recorded the frequency of terms used to describe health-related issues and outcomes. A credit was identified as including "mention of health" if the credit materials included terms that directly relate to health and well-being. In addition to this qualitative assessment of a credit's mention of health, the use of health-related language was measured quantitatively by tracking specific terms in the electronic versions of the rating system reference guides.

Preliminary analysis of LEED 2009 revealed highly diverse health-related language including many terms that are non-traditional from a public-health perspective. Because the core purpose of this analysis was to establish a baseline understanding of current health representation within LEED, we intentionally utilized a highly inclusive definition of "health-related" to minimize data loss and avoid imposing a pre-defined health framework. As a result, by design, terms not traditionally thought of as relating to health within the public health field were included. The most common health-related terms used by the rating systems include "productivity," "comfort," and "well-being." Such terms were viewed as proxies, the presence of which indicates a more-traditional health outcome was implicated by the credit in question.

Findings

As displayed in Figure 1, every LEED credit category contains health-related language and references except for the category that addresses water efficiency. However, there is significant variation in the organization of health-related strategies across LEED credit systems. For example, the majority of health references made in LEED-EB are found in the Indoor Environmental Quality credit category, while LEED for Healthcare includes many references to health in the Sustainable Sites credit category. LEED for Neighborhood Development is not included in Figure 1 due to its unique organization. Instead of having 7 credit categories, LEED ND has 5 credit categories, each of which contain references

FIGURE 1. Percent of credits that mention health and well-being by LEED 2009 rating system

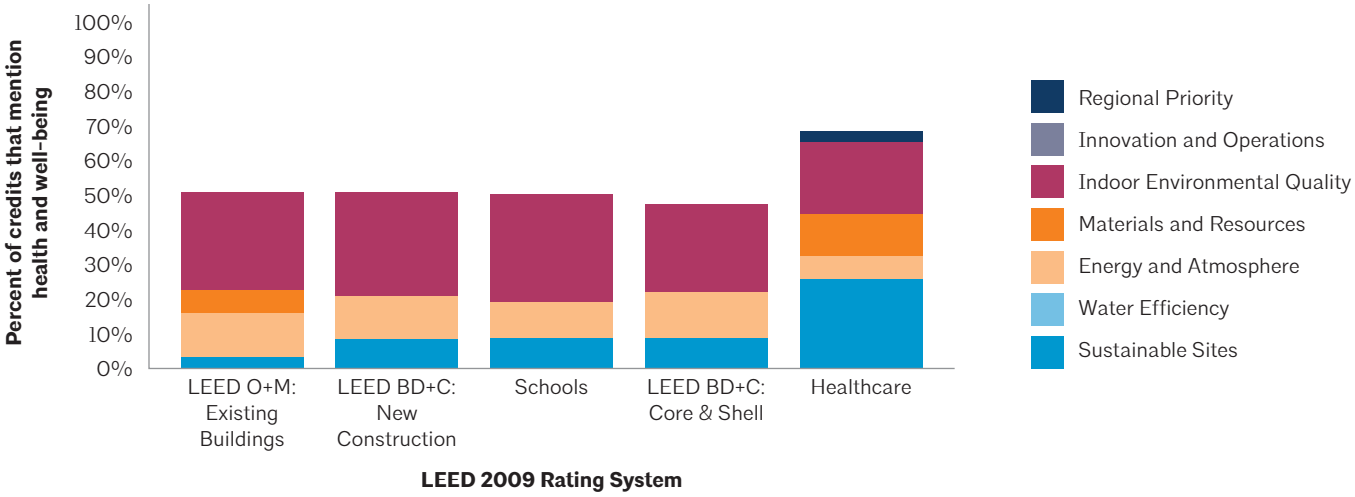


FIGURE 2. Percent of credits that mention health and well-being by LEED 2009 rating system

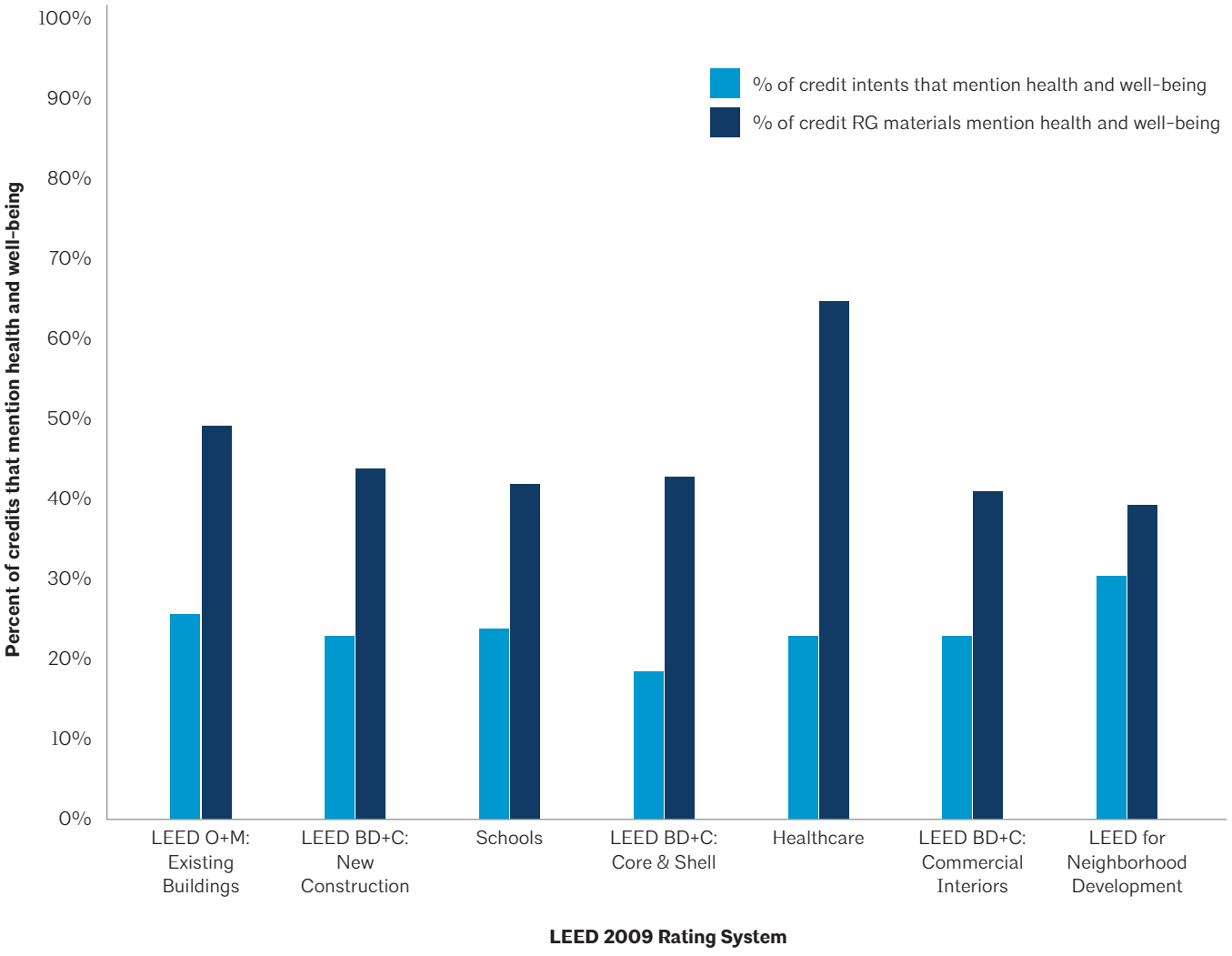
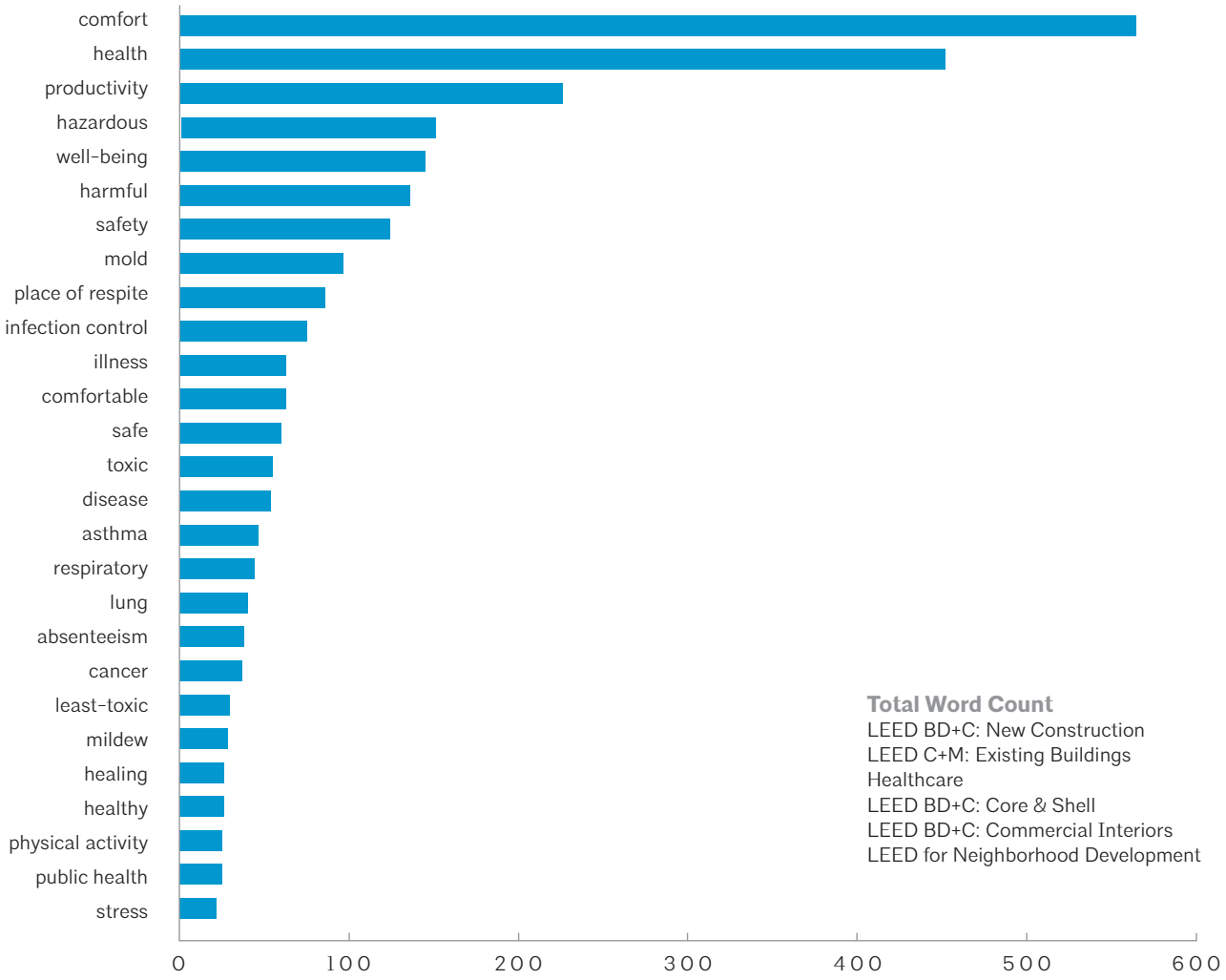


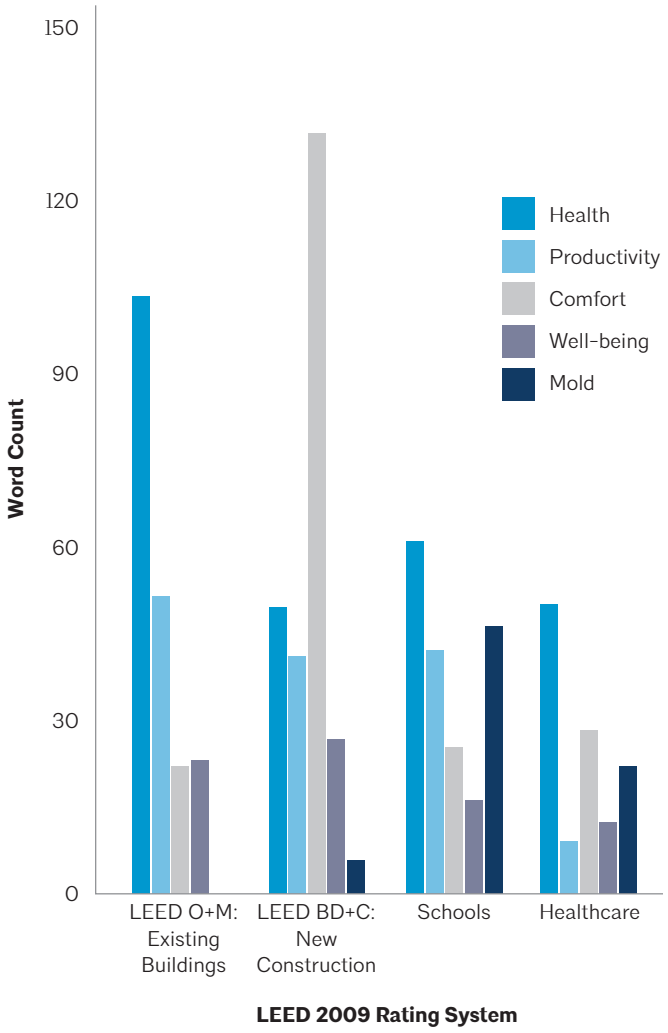
FIGURE 3. Health-related terminology in LEED 2009 rating systems



to health and well-being. Similar to the other rating systems, health-related credits in LEED ND are not consistently distributed across credit categories. Within the Neighborhood Pattern and Design category in LEED ND, 15 out of 18 credits mention health while only 6 out of 21 credits in the Green Infrastructure and Buildings category include reference to health and well-being. In addition to this variation between credit categories, Figure 2 highlights variation found within credits. The overwhelming majority of health references in LEED 2009 are made within the reference guide (RG) materials and not the credit intent language.

A second major finding illustrated in Figure 3 is that LEED 2009 uses a wide range of terminology to describe health-related issues and this terminology varies significantly between rating systems. Within the LEED 2009 rating systems and reference guides analyzed, "comfort" was the most widely used health-related term and appeared 566 times. Other common terms include "health" (appeared 453 times), "productivity" (appeared 225 times) and "hazardous" (appeared 152 times). "Well-being" is also a frequently used term (appeared 144 times) as are words that are more closely linked with traditional health frameworks such as "illness" (63 times), "asthma" (44 times), and "physical activity" (24 times). When comparing LEED rating systems in Figure 4, criteria in LEED-EB make the largest number of references to the term "health," while LEED-NC emphasizes the term "comfort."

FIGURE 4. Health-related terminology by LEED 2009 rating system



In spite of the great variation of health-related terminology present in LEED 2009, LEED currently addresses a narrow scope of health issues. The most well-defined health domain represented in LEED relates to indoor air quality. In LEED-NC 2009, 13 of the 57 credits relate to indoor air quality optimization. Other prominent health domains addressed by LEED 2009 in a less clearly defined manner include physical activity and the concept of "comfort" stemming from mental well-being.

Discussion

References to health and well-being in LEED 2009 are frequent; however, the language used to describe these intentions and strategies is diverse, sometimes inconsistent, and potentially difficult to link to public health practice. The presence of health-related credits in almost every LEED credit category indicates that opportunities to promote health outcomes are to be found across all aspects of green building practice. However, the current presentation of health in LEED 2009 does not highlight these opportunities.

LEED's approach to health is inconsistent across rating systems and credit categories within rating systems, likely due to the consensus-based process that produces LEED rating systems. USGBC has previously engaged public health professionals in the creation of specific LEED rating systems including LEED for Neighborhood Development and LEED for Healthcare. Likewise, public health organizations have engaged with USGBC to utilize the LEED platform for narrowly focused health promotion efforts. These include the New York City Department of Health that targeted LEED as a tool to achieve population-level change by translating its Active Design Guidelines into LEED pilot credits.[19] However, these isolated efforts have not created a consistent approach to health within LEED. The inconsistent approach to health is apparent through the large number of health-related terms that are referenced to, and applied, in many different ways. The use of these terms in rating systems and reference guides is not necessarily consistent with technical definitions and conventional usage in the public health community. This creates a potential barrier to broad-scale interdisciplinary communication and evaluation. A framework for sustained and broadly focused collaboration between public health and green building is lacking.[17]

The results of this study have highlighted opportunities to encourage the use of existing LEED credits that address health and will inform future interdisciplinary work conducted by the public health and green building industries around the use of certification as a public health promotion tool. However, this study was limited in scope and only represents an initial step towards the ultimate vision of building health-enabling places for all.

This research has not provided an operational definition of health as it relates to the built environment in general or to LEED specifically. Additionally, there are inherent limitations to the structure of LEED that will affect its utility for health promotion. One example is the process of certifying a building based on the presence of strategies that *intend* to have a beneficial outcome. Currently, there is not a widespread mechanism of reporting back on the success of those strategies to achieve their intended purpose. However, this may soon change given the promise of emerging information technologies.[20]

Conclusions

Health, wellness, and enhanced occupant experience are expected outcomes from many green building strategies. Green building practitioners share a belief that features such as daylighting and ventilation can improve occupant comfort. They have also argued and advocated that efforts to reduce energy use and mitigate greenhouse gas emissions and traditional-criteria air pollutants have far-reaching benefits for society.[21] Improved health has been a valued outcome of LEED since its conception and therefore health-related intentions are common throughout LEED rating systems. However, we found that the language used in LEED 2009 to describe these intentions and strategies is diverse, sometimes inconsistent, and potentially difficult to link to public health practice. The inconsistent or idiosyncratic use of health-related terminology makes it difficult to engage with health researchers or connect with established public health surveillance and data-collection systems. It also makes it challenging for owners, investors, and other decision makers to clearly specify desired health-related outcomes, understand connections to individual strategies, and rigorously evaluate outcomes.

LEED is a tool that has proven its ability to create population-level change and promote the uptake of green building practices within the U.S. and across the world.[18] In order for LEED's power of market transformation to be leveraged for health promotion, the health intents and expected outcomes of specific green strategies must be better articulated. Prioritizing health utilizing LEED 2009 would also be difficult due to the narrow scope of health-related strategies currently in place. Nonetheless, LEED is constantly changing and improving. These shortcomings should not discourage public health professionals from viewing LEED as an action-oriented tool that can be leveraged for health promotion.

This study illustrates the importance of health promotion as an intended outcome of green building as represented by LEED. While health is an articulated priority and an explicit anticipated benefit or co-benefit of green building design and operations, our findings suggest specific areas for improvement to strengthen connections between intentions and outcomes and to utilize specific terminology that aligns more closely with concepts used in the public health community. Ultimately, these kinds of changes will make it easier to understand and achieve the long-standing aspirations for buildings that promote human health, contribute to physical, emotional and social wellbeing, and provide superior occupant experience. By facilitating greater collaboration with the public health community, there is an opportunity for green buildings to move past the premise of "do no harm" to a focus on holistic health promotion.

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