The Built Environment as a Social Determinant of Health

Rosemary Nabaweesi, MBChB, DrPH[a,*], Marie Hanna, MD[b], John K. Muthuka, PhD[c], Adrian D. Samuels, PhD[a], Vanisha Brown, PhD, MPH[d], Dawn Schwartz, MEd[e], Green Ekadi, PhD[d]

KEYWORDS

• Built environment • Racism • Health disparities • Housing quality

KEY POINTS

- The built environment contributes significantly to one's health and well-being both mentally and physically.
- The built environment our patients reside in, work in, and play and learn in largely depends on their race and socioeconomic status.
- When managing patients, consider the patient's-built environment at home, workplace, school, and respective neighborhood and mechanisms affecting their health: indoor microbiome, neighborhood effects, toxins, injury risks, safety or security, and walkability.

INTRODUCTION

The built environment touches all aspects of our lives. It encompasses the buildings we live in; the distribution systems that provide us with water and electricity; and the roads, bridges, and transportation systems we use to get from place to place. Significant health disparities across disease manifestations and associated structural racism in our society highlight the need for an in-depth examination of the built environment as a social determinant of health (SDOH). This article will discuss the

[a] Center for Health Policy, School of Graduate Studies, Meharry Medical College, 1005 Dr. D. B. Todd Jr. Boulevard, Nashville, TN 37208, USA; [b] Family Medicine, PGY-3, Meharry Medical College, 1005 Dr. D. B. Todd Jr. Boulevard, Nashville, TN 37208, USA; [c] Kenya Medical Training College, PO Box 30195-00100, Nairobi, Kenya; [d] School of Graduate Studies, Meharry Medical College, 1005 Dr. D. B. Todd Jr. Boulevard, Nashville, TN 37208, USA; [e] Department of Health Policy, Vanderbilt University Medical Center, 2525 West End Avenue, Suite 1201, Nashville, TN 37203, USA
* Corresponding author.
E-mail address: rnabaweesi@mmc.edu
Twitter: @rnabawe1 (R.N.); @johnmuthuka1 (J.K.M.)

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historical and social-political events that shaped the nation's built infrastructure at its inception and how local, state, and federal policies have consolidated neighborhood segregation.

The article describes the impact one's physical environment has on their well-being, both physically and mentally, through direct or indirect mechanisms. We discuss public health effects including safety, health, physical and psychological trauma, and adverse childhood experiences (ACEs). It is important that physicians understand the historical and sociopolitical contexts that frame the built environments in the catchment areas they serve. The article will explore opportunities and options that primary care physicians can use to help improve patient outcomes within their built environment to improve overall health status, minimize health risks, and speed recovery from ill health.

The Built Environment

The built environment can be described as the man-made or modified structures that provide people with living, working, and recreational spaces.[1] The built environment is meant to provide safety, health, wellbeing and meaning to its dwellers, as a place to rest, work, live, learn, play, and thrive.[2,3] In the twentieth century, the American Public Health Association developed a report on the *Basic Principles of Healthy Housing*[4] identifying 30 principles to cover people's physiological and psychological health and protect them from infections and injuries. Several recommended measurements and requirements are still applicable in today's housing design and embedded in the building codes. The 5 primary performance indicators for healthy buildings today originated from APHA's Basic Principles of Healthy Housing: (1) thermal environment, (2) indoor air environment, (3) daylight and lighting environment, (4) noise, and (5) safety. Lately, healthy building performance indicators are more focused on physiological indicators, due to an increased understanding of factors affecting overall human performance and cover lighting, thermal comfort, personal security, ventilation, and moisture control. As housing is generally regarded as a cardinal SDOH.[5] physicians should endeavor to understand, investigate and work to mitigate these issues that relate to the overall health of their patients.

Negative physical health effects of poor housing include toxins within the home, mold, cold indoor temperatures, and overcrowding among other safety factors, all of which need to be explored more during the limited time physicians have with their patients. The negative mental health effects of a poor built environment have been documented even more extensively because it has been linked to stress, depression, and anxiety.[6]

The adverse impacts of health disparities and structural elements of racism over the life span of our society highlight the need for an in-depth examination of the built environment as a SDOH. Although further research is needed on the effects of a built environment on a patient, given the evidence that does exist, it is adamant that primary care physicians incorporate exploring environmental impacts on their patients' health into the clinical care visit.

History: the Creation of Racially Segregated Residential Neighborhoods

White and minoritized families have generally lived segregated lives throughout American history. Black and White families were segregated throughout history because of racist ideologies and policies. Three types of federal, state policies and practices were designed to introduce racial segregation in previously integrated neighborhoods while reinforcing racial segregation in others.[7,8] These policies further linked racial and economic segregation by concentrating Black poverty and White affluence across the

country. The policies include (1) public housing, (2) exclusionary and industrial zoning, and (3) redlining.[8,9]

The first public housing developments for civilians were created as part of the New Deal under President Roosevelt to address housing shortages from the Great Depression and World War II. These were meant for lower middle-class White families and were not subsidized. After World War II, the G.I. Bill was passed to assist returning veterans and better position them to take advantage of the booming postwar economy. One main provision of the G.I. Bill was low interest loans to veterans to increase home ownership. However, Black war veterans were denied the wholesale benefits of the G.I. Bill. Instead, Black families seeking mortgages faced discriminatory practices from local lenders and home insurers that prevented access to home loans or forced them to accept loans at much higher interest rates than comparable White families. For those who did qualify, they were denied purchasing homes in White neighborhoods with racial covenants and redlining, which is denying a home loan or insurance to someone who lives in an economically undesirable area.

With the inability to gain home ownership, many Black families moved to White vacated public housing developments, which also accelerated "white flight" to the suburbs. The 1949 Housing Act enacted under President Truman increased public housing across the country including the development of massive, high-rise residential buildings in many cities. Although public housing became available to more Black families, the Housing Act promoted and consolidated racial segregation of the units with increased capacity and access, as greater divides between White and Black neighborhoods were strengthened with legislative, business, and social policies.[10,11]

As the housing market across America became more racially divided in the mid-twentieth century, the real estate industry lobbied to severely limit the reach of public housing. Subsequent new regulation imposed strict upper-income limits to qualify for public housing, transforming it into concentrated areas of inner-city poverty.[10,12] With the growing supply of housing in the 1950s, there was a cultural shift toward suburban, single-family home ownership, supported by other favorable government actions, such as the construction of the interstate system, which added to "white flight" from metropolitan areas.

This cultural and structural shift not only relegated public housing to the poor but also relegated specifically to poor Black families. The loss of middle-class rents to support public housing also brought about severe reductions in maintenance budgets.[12] The latter explains the building dilapidation associated with public housing, confining minority mostly Black families to poorly maintained housing. Racial residential segregation not only meant separate in physical location but also systematically unequal.[13] Segregation based on racial differences has been linked to numerous causes of racial disparity and inequalities, with educational attainment and economic mobility being the chief contributors.[14]

SHAPED BY LAW AND GOVERNMENTAL DECISIONS

Built environment for residential and commercial use is governed by a complex set of local, state, and federal laws. Current inner-city residential neighborhoods are based on outdated racist urban land use practices codified into law in 1933 with the Home Owner's Loan Act. The act established the Federal Home Owner Lending Corporation designations for assigning parcel values and more specifically the bias of lending only to White suburban families.[15,16] Residential segregation was legitimized and adjudicated through structures of government, finance, home sales, and zoning, a practice

known as "redlining."[17] Although this legal practice was struck down in the 1960s, existing health inequities/disparities map directly onto the historical redlined regions.

It is costly to ensure all housing standards are met. People experiencing poverty, such as communities with historical deinvestment are left with few options but to live in substandard housing, couch surf or remain unhoused. Substandard housing affects inhabitants' physical and mental health, and well-being via various mechanisms including indoor microbiome, chemical, neighborhood effects, and physical and social factors.[6,18]

Evidence shows that cost-burdened households are prevalent among low-income and minority populations.[19] Cost-burdened is defined as spending more than 30% of Average Median household Income on housing costs. Cost-burdened shares are much higher among Black (45%) and Hispanic households (43%) than among Asian and other minority households (36%) or White households (27%). Additionally, within the same income group, larger shares of minority groups are cost burdened.

Connection of Housing to Physical and Mental Health

Built environment affects health-related outcomes through various domains including land use, street environment, transportation infrastructure, green and open spaces, and neighborhood facilities.[20] The main built environmental factors that determine peoples' health development, health challenges, and health equity include accessibility and quality of housing. Evidence shows that substandard housing features, which are common in public housing, for example, lack of hot water, safe drinking water, effective waste disposals, and pest infestation contribute to spread of infection.[3,21] Studies have shown that significant health disparities documented in asthma and other chronic respiratory diseases are associated with damp, cold, moldy housing even after controlling for income, smoking, and overcrowding.[6,19,22] Water intrusion from interior and exterior leaks is the major cause of dampness. Overcrowding and poor ventilation are the other contributors. The mechanism of respiratory illness is through mites, roaches, molds, and viruses, all of which thrive on damp environments. Pest infestation particularly roaches and mites have been shown to cause allergenic sensitization and thus asthmatic triggers.[23]

A second attribute of hazardous housing is chemicals such as lead, asbestos, radon, carbon monoxide, and tobacco smoke carcinogens.[24,25] Literature presents strong evidence associating poor mental health to disadvantaged neighborhood's built environments with examples such as unclean air (radon) and water (Flint lead crisis) unsafe, insecure neighborhoods, which also threaten children's and their families' physical health, and safety.[6,26–28] There is evidence to show that residents living in disadvantaged neighborhoods have higher rates of stress, cancer, and depression.[29,30]

Adverse Childhood Experiences

According to the Centers for Disease Control and Prevention, ACEs are potentially traumatic events that occur during childhood and include witnessing violence, having a parent imprisoned or dying, substance abuse, and racism. ACEs have been shown to occur at higher rates among people living in conditions of poverty, in neighborhoods with high crime rates, and high levels of exclusion from economic investment.[31]

Evidence shows that experiencing more than 3 ACEs predisposes people to chronic metabolic diseases such as addictions, obesity, cardiovascular disease, and other behavioral challenges such as difficulty with learning resulting in poor educational outcomes. Promoting safe, stable nurturing environments and relationships where children live, grow, learn, and play reduces the likelihood of multiple ACEs occurring.

Effectively healing influenced communities entails restoring and maintaining the roads, parks, buildings, and transportation infrastructure so that they can foster positive social interaction with economic mobility and safety.[3,11,25,32]

Psychological trauma: impact of chronic and toxic stress on health

Types of building (eg, high rise), floor level and overall housing quality have been associated with mental health changes in dwellers such as depression, anxiety, negative affect, and behavioral disturbances. Mothers with young children (**Fig. 1**) living in high-rise multiple unit dwellings report various degrees of psychological distress. Possible explanations for this association are the social isolation and limited play opportunities for children as well as safety concerns for their children (eg, predisposition to falls).[28] Women in large high-rise buildings (old style project housing) report higher levels of loneliness and diminished territorial control than their counterparts residing in different housing types.

There is an inverse association between housing quality and psychological distress.[6,23] Sound housing structural quality, maintenance and upkeep, amenities are associated with mental well-being (**Fig. 2**). Although studies on mental health and built environment are mostly cross-sectional, and rely on self-reports, research shows that when people move to better housing their mental health improves.[3,33,34] Some of the explanations for the housing quality affecting mental health include insecurity associated with low-quality housing, unresponsive landlords, and unending disrepair.[6,18,23] Lack of affordable housing means people with low-incomes relocate frequently and are forced to live in undesirable environments. Involuntary relocation not only causes stress in adults but also affects psychological adjustment.[18,28,35] Frequent relocations have been reported to cause socioemotional problems among children.[6,28]

DISCUSSION

Neighborhoods with concentrated poverty are defined as areas where 30% or more of the residents live in households whose income is below the Federal poverty line.

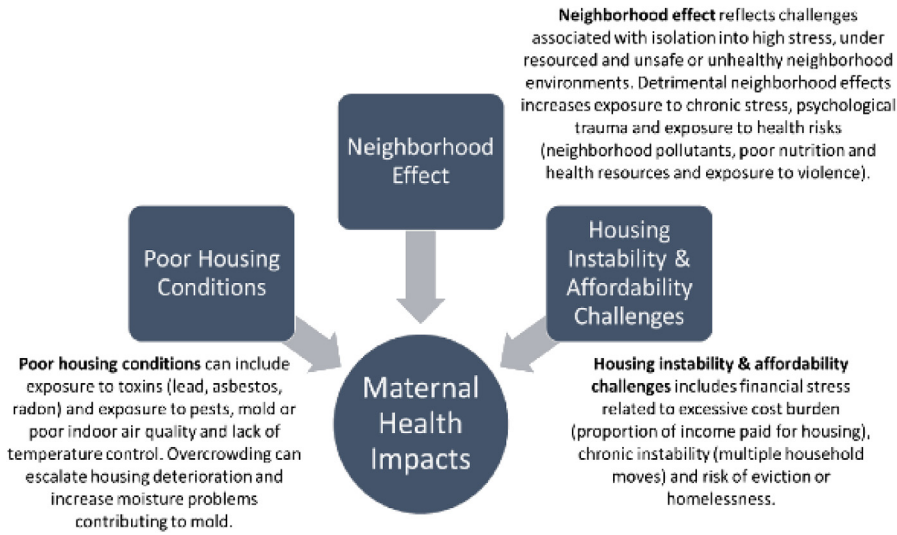

Fig. 1. Housing pathways that affect infant and maternal health. (*From* Reece J. More Than Shelter: Housing for Urban Maternal and Infant Health. Int J Environ Res Public -37782550863500Health. 2021;18(7):3331. Published 2021 Mar 24.)

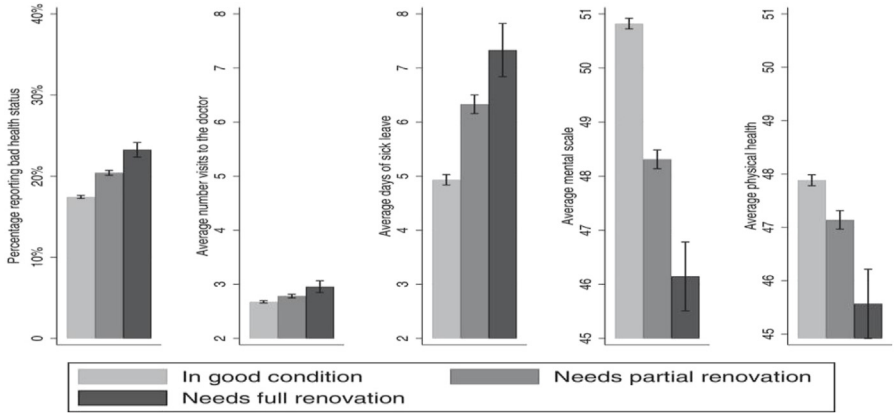

Fig. 2. Housing conditions and occupant health. (*From* Palacios, J, Eichholtz, P, Kok, N, Aydin, E. The impact of housing conditions on health outcomes. Real Estate Econ. 2021; 49: 1172–1200.)

Neighborhoods with concentrated poverty are a common occurrence across the country and are found in both large and small metropolitan cities. Overall, about 6.7% of the US population lives in these neighborhoods, whereas 12.5% of Hispanic population and 20% of African Americans live in such neighborhoods. The Pew Charitable Trust has shown a link between high-concentrated poverty neighborhoods and downward mobility, higher rates of mobility (unstable housing), unemployment, poor-quality schools, and increased violence and resulting threats to families' economic security.[15,22,36]

Segregated housing came into being initially by historical local, state, and federal housing policies that intentionally discriminated against Black and Brown people and discouraged investment in particular communities. These policies along with present day exclusionary zoning policies create neighborhoods of concentrated poverty and disadvantage. Segregation by race, ethnicity, and income are often intertwined, and Black youth are 10 times more likely to live in disadvantaged communities than their White counterparts. Child Trends' scientists, have shown that children living in high poverty-concentrated neighborhoods are harmed via these 5 mechanisms.

1. Children attend low-quality schools beginning in preschool. The schools in high poverty-concentrated areas have fewer resources, spend less on staffing, have inadequate instructional material, and have worse physical buildings.
2. High concentration of environmental hazards. Risks inside the home include hazards associate with older, deteriorating houses such as mold, pest infestation, and peeling lead paint and contaminated water from lead pipes. Risks outside the home arise from proximity to highways, and poor air quality from nearby industrial sources.
3. Reduced or lack of safe outdoor spaces for children to play. Outdoor play is associated with several health benefits including executive functioning and physical fitness. These neighborhoods are more likely to have unsafe parks, sports fields, biking and walking trails, and playgrounds if they have them in the first place. Presence of physical harmful effects such as broken glass may also be coupled with environmental hazards.
4. Children are more likely to experience ACEs such as violence, imprisonment of a parent, neglect (physical or emotional). These traumatic events can trigger

powerful stress responses in children resulting in lifetime impacts such as obesity, depression, and addictions.
5. Significantly reduced likelihood of economic mobility.

SUMMARY

The built environment contributes significantly to one's health and well-being both mentally and physically. The built environment our patients reside in, work in, and play and learn in largely depends on their race and socioeconomic status. When managing patients, consider the patient's built environment at home, workplace, school, and respective neighborhood and mechanisms affecting their health: indoor microbiome, neighborhood effects, toxins, injury risks, safety or security, and walkability.

CLINICS CARE POINTS

Consider the following risks when evaluating your patients' clinical condition and provide anticipatory guidance accordingly.

- Physical injury inside or outside the home, workplace, or school
- Exposure to toxins inside the built environment (home/work/school)
- Environmental hazards such as motor vehicle crashes, pedestrian struck, chemical exposures, air pollution, and broken glass in playgrounds
- ACEs
- Recommend social work services when patient is experiencing housing challenges
- Collaborate with your public health departments and divisions to tap into resources such as Health Homes programs by home visitors

Advocate for your patients in these areas.

1. Deimplement harmful policies
2. Implement equitable policies
3. Correct historical injustice

Health-care organizations are encouraged to support community investments that improve built environment conditions and promote physical and mental health for all populations across the life span.

DISCLOSURE

The authors have nothing to disclose.

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