This article reviews the evidence linking housing affordability, overcrowding, and dilapidation to both physical and mental health. It also presents several ways that public health and city planning professionals can work together to address those housing-related health problems.

In the 19th century, the interests of the public health and city planning professions were closely aligned. Both fields focused on the effects that poorly designed and maintained housing had on the health of city dwellers. But in the 20th century, once some of the worst housing conditions had been addressed through the adoption of new building and sanitation codes and other improvement efforts [1], the 2 fields diverged. Since the 1990s, however, they have been growing closer once more, as both have begun again to focus on the effects of housing on health.

This paper provides an overview of recent research on the impact of housing on both physical and mental health. Three dimensions of housing are considered: affordability; overcrowding; and condition of housing. Each of these affects health in a different way.

Housing Affordability

US Department of Housing and Urban Development guidelines consider housing to be “affordable” when it is occupied by a homeowner who spends no more than 30% of his or her income on housing costs (mortgage payments, insurance, property taxes, and utilities) or by a renter who spends no more than 30% of his or her income for rent and utilities. At the time of the 2010 US Census, there were more than 3.7 million occupied housing units in North Carolina, 66.7% of which were owner-occupied; the remaining 33.3% were occupied by renters [2]. Census data also indicates that the percentage of homeowners paying 30% or more of their incomes for housing (see Figure 1) rose between 2000 and 2010 from 20.7% to 32.2% [3, 4]. During the same time period, the percentage of renters paying 30% or more of their incomes for rent (see Figure 2) rose from 33.4% to 48.9%. In 2010, 645,006 homeowners and 509,691 renters in North Carolina were living in unaffordable housing.

Lack of affordable housing can have serious health consequences, especially for low-income families. Researchers have studied both the direct and indirect effects of high housing costs on the health of low-income families. Mental health is directly affected. The indirect effects are related to the trade-offs families make as they compensate for high housing costs. Financial burdens force low-income families to choose between paying for health care and paying for food, heating, or other things they need; having to sacrifice any of these because of inability to pay can threaten the health of these families [5]. Many low-income families who have to spend excessive amounts of their income on housing cannot afford health insurance or adequate medical care and are more likely to experience food insecurity (defined as having to reduce the size or quality of meals or skip meals entirely). All of these things can in turn have short- and long-term health consequences.

A substantial body of literature has demonstrated that lack of affordable housing can contribute to poor health. Studies support a strong link between high housing costs and lack of health insurance or lack of medical care [6]. One national study found, for example, that low-income adults living in unaffordable housing were more likely to lack health insurance than were low-income adults living in affordable housing [7]. Another study found that low-income families who have difficulty paying their mortgages or rents were less likely to have adequate medical care and were more likely to postpone medical treatments [5].

High housing costs have also been found to be associated with food insecurity. A recent study in the state of Washington demonstrated a clear association between lack of affordable housing and food insecurity. Although the state has a relatively low poverty rate, 20% of renters there reported that they had difficulty meeting basic needs—by purchasing food, for example [8]. In addition, a number of studies have found that children in low-income families without housing subsidies are more likely to suffer from iron deficiencies, malnutrition, and underdevelopment compared with children in similar families receiving housing assistance [9].
Lack of affordable housing can also contribute to poor mental health. Low-income families tend to move more frequently in their search for an affordable home, and this has detrimental health effects, particularly on children. Studies have shown that high mobility is associated with adverse health outcomes, including heightened stress levels, depression, and emotional and behavioral problems [10]. Studies have also shown that parents facing imminent eviction exhibit high levels of stress and that this has a negative influence on the mental health of their children [9]. Under such circumstances, parents find it hard to obtain continuous medical treatment and care for their children, and children with chronic diseases are particularly affected.

**Overcrowding**

One of the consequences of the lack of affordable housing is overcrowding within units. Some households cannot afford to rent or buy a home large enough to comfortably accommodate household members, or they may have to double up with other households to put a roof over their heads. The most common definition of an overcrowded housing unit is one with more than 1 person per room, although some research studies adopt a higher cutoff of 1.5 persons per room. Although the percentage of overcrowded housing units in North Carolina dropped from 3.4 to 2.1 percent between 2000 and 2010, as of 2010 there were still 75,373 overcrowded housing units in the state [3, 4].

Overcrowding may affect health in several ways. First, the limited amount of space per person may increase the transmission of airborne infections such as tuberculosis, bronchitis, and pneumonia. Second, overcrowding may constrain the types of activities that household members can comfortably undertake in the home or may cause stress among household members trying to engage in conflicting activities, such as watching television and studying. Chronic stress due to overcrowding may lead to more severe mental health problems.

The results of research on the relationship between overcrowding and health provide strong support for the notion that overcrowding has an independent effect on several dimensions of physical health. The evidence linking overcrowding to respiratory infections in children, including bronchitis and pneumonia, is quite strong [11]. Similarly, rates of tuberculosis have been found to be higher for those living in overcrowded units [12]. In addition, higher rates of meningitis have been found among children living in overcrowded housing units. And overcrowding has also been linked to mental health problems,
fixed-income seniors, particularly those who are mobility impaired, need ready access to public transportation, and are isolated from children or other support systems. The US Department of Housing and Urban Development and the US Department of Agriculture (through its Rural Development Housing Programs) are the largest supporters of subsidized apartment communities for seniors, which feature studio to 2-bedroom apartments, onsite management that can respond to problems and create a sociable environment, and amenities such as hair salons, libraries, and computer labs. DHIC has built 10 senior communities, where the average resident is a widowed female over the age of 70 with an income less than $20,000. DHIC partners with Resources for Seniors in Wake County to provide regular health screenings and other relevant programming to keep residents feeling healthier, safer, and less isolated.

Children’s HealthWatch has found that young children experiencing housing insecurity because of frequent moves or overcrowded homes are 50% more likely to be in poor health and are 70% more likely to exhibit developmental delays [1]. Safe, stable, and affordable rental housing for families can be difficult to find in a place like the Research Triangle, where sustained high population growth has increased competition for apartments that are close to employers and amenities. Affordable apartments for families are also the most difficult type of affordable housing for developers to build, as the cost of land and infrastructure improvements can require more subsidy than the public sector is willing or able to provide. The Federal Low-Income Housing Tax Credit has attracted significant investment from the private sector, but competition is fierce. Some communities also feel threatened by the placement of affordable family apartments in their communities and actively oppose these development projects.

What makes affordable housing, and thus healthier communities, possible? Collaboration among community residents and stakeholders, including health care providers, employers, and educational institutions, to ensure that affordable housing is included in community visions and plans; cooperation between affordable housing developers, public and private investors, social service providers, and neighborhood residents to ensure successful, durable, sustainable development; and a commitment on the part of policymakers to pay attention to the evidence that affordable housing pays off—and to increase available subsidies for it. NCMJ

Bethany E. Chaney development and communications consultant, DHIC, Inc, Raleigh, North Carolina.

Acknowledgment
Potential conflicts of interest. G.W. and B.E.C. have no relevant conflicts of interest.

References

Electronically published October 12, 2012.
Address correspondence to Gregg Warren, DHIC, Inc, 113 S. Wilmington Street, Raleigh, NC 27601 (Gregg@dhic.org).

including anxiety and depression, particularly among adult women [13].

Housing Conditions
Although there is no official federal or state definition of substandard housing, the Department of Housing and Urban Development provides a number of guidelines for determining what constitutes a substandard house. Factors that may make housing substandard include lack of indoor plumbing facilities, lack of heating or inadequate heating, lack of electrical service, lack of adequate sewage disposal, frequent water system breakdowns, lack of kitchen facilities, struc-
Using Housing Code Enforcement to Improve Healthy Homes
Beth McKee-Huger, Lori Loosemore

Substandard housing results in more than $100 million in annual health care and related costs for North Carolina children [1]. Mold, cockroaches, and other pests often exacerbate asthma; combustion appliances that lack adequate ventilation can cause carbon monoxide poisoning; unsafe wiring can electrocute or cause fires; and deteriorating older paint exposes children to lead poisoning. These and other unsafe housing conditions are code violations, so code enforcement can be an effective preventive health strategy.

Greensboro Housing Coalition (GHC), a nonprofit advocate for safe and affordable housing, helps tenants, rental owners, and homeowners find ways to correct unhealthy housing conditions and helps members of the community work cooperatively to resolve complex problems.

For example, 3 little girls and their mother repeatedly rushed to the hospital with respiratory distress. After writing many prescriptions, their physician inquired whether there were moldy conditions in their home. The mother said that she had asked the landlord many times to fix water leaks, without success. A Greensboro inspector cited the apartment for code violations and noted that the complex manager was slow to comply with repair orders. GHC helped the family contact an environmental consultant; the lab report the consultant requested showed high levels of Aspergillus, Penicillium, and Chaetomium spores. After GHC helped the family move to a safer environment, the health of the children improved.

Working with City of Greensboro inspectors to achieve better compliance with code enforcement orders, GHC urged the Greensboro City Council to enact a local ordinance in 2003 requiring that all rental housing, except those constructed in the past 5 years, to be inspected and certified as meeting minimum housing standards. According to a September 2010 presentation by a Greensboro code enforcement manager to the Rural Unit Certificate of Occupancy (RUCO) advisory committee, after the RUCO ordinance was enacted, the number of housing units with code violation orders dropped 77% in 8 years. Houses and apartments were inspected before conditions deteriorated to the point that occupants complained, promoting preventive maintenance, and rental owners usually complied with repair orders within the time allowed.

However, in 2011, the North Carolina General Assembly passed legislation limiting the authority of local governments to require periodic inspections [2]. The new law allows inspection when there is a reasonable cause to believe that unsafe conditions exist, including both complaints and a history of noncompliance. The law limits the authority of local governments to make inspections without “reasonable cause,” so cities cannot inspect until the problem is already known. Now the City of Greensboro is meeting with GHC and other stakeholders to explore the most effective ways of improving housing stock within the constraints of this state legislation. Inspectors continue to respond to complaints, but doing so addresses housing conditions only after problems have been identified, and under those circumstances owners tend to be slower to comply. Other strategies allowed by the legislation include inspection of properties of owners with multiple code violations and inspection of all properties in geographic areas that are targeted because of concentrations of substandard housing.

Since the legislative change in 2011, the GHC Healthy Homes Specialist has experienced a higher volume of calls from tenants, many of whom are experiencing respiratory and other symptoms. When the Healthy Homes Specialist does a housing assessment, she often finds serious housing problems including: leaking water and sewage, holes allowing entry of rats and roaches, and lack of operable...
smoke alarms. In many cases, the tenants have repeatedly requested repairs without success and want to move out. These conditions are a direct violation of North Carolina landlord-tenant law and minimum housing codes. Not only do such conditions jeopardize the health of tenants, they also decrease the value of the owner’s investment and can subject the owner to litigation.

GHC is reaching out to owners to find mutually beneficial ways to protect tenant health and reduce vacancies, encouraging cooperation between tenants and landlords and informing owners of repair resources. For example, Guilford County Department of Public Health has a responsibility to investigate and order remediation of lead hazards when a child has a high blood lead level. GHC helps by urging the owner to apply for City of Greensboro grants for lead remediation. Also, GHC checks homes for indications of lead risks to prevent children from being poisoned by lead, and when appropriate, refers the owners to the City of Greensboro lead program. The City of Greensboro has several grants for lead hazard remediation and energy efficiency upgrades for homes occupied by low-income families, if the owner corrects code violations.

GHC educates tenants, owners of rental property, homeowners, and the community about the health and economic benefits of healthy homes. The 7 principles of healthy homes espoused by the National Healthy Homes Training Center and Network are to keep the home dry, clean, ventilated, pest-free, safe, contaminant-free, and maintained.

GHC encourages collaboration among community partners, including the City of Greensboro, the Guilford County Department of Public Health, Legal Aid of North Carolina, Housing Greensboro, North Carolina A&T State University, and the University of North Carolina at Greensboro. Through cooperation on policy recommendations to promote healthy homes, outreach to residents in at-risk housing, and community education, GHC helps the community resolve the complex issues of substandard housing.

Beth McKee-Huger, MSW executive director, Greensboro Housing Coalition, Greensboro, North Carolina.

Lori Loosemore code compliance administrator, City of Greensboro, Greensboro, North Carolina.

Acknowledgments

Financial disclosure. GHC receives funding from the City of Greensboro for lead outreach and education and from the National Center for Healthy Housing for promoting policies related to healthy homes.

Potential conflicts of interest. B.M.H. and L.L. have no relevant conflicts of interest.

References


Electronically published October 12, 2012.
Address correspondence to Ms. Beth McKee-Huger, Greensboro Housing Coalition, 122 N Elm St, Ste M-2, Greensboro NC 27401 (beth@greensborohousingcoalition.com).


tural problems (such as leaking roofs, cracks in walls, peeling paint, or holes in floors), and a number of common area problems, including inadequate lighting and loose or broken stairs or stair railings.

One of the datasets commonly used to measure the extent to which housing in the United States is substandard is the US Census Bureau’s American Housing Survey (AHS). The AHS collects detailed data on the quality of housing on a nationally representative sample of housing units, but unfortunately, state level estimates are not available. The US Census, however, reports data on incomplete plumbing and incomplete kitchen facilities. According to the 2010 census, plumbing or kitchen facilities were lacking or incomplete in more than 39,000 housing units in North Carolina in 2010 [3, 4].

There is a substantial body of research that associates features of substandard housing with a wide range of negative health outcomes, including chronic illnesses, infectious diseases, injuries, and poor mental health [14]. Many of these health problems stem from lead paint, poor air quality, poor water quality, fire hazards, and injury hazards.

Abundant empirical evidence connects substandard housing conditions to health problems. The effects of mold, pest infestations, and other toxins on respiratory conditions are particularly well documented [15]. Ample evidence also exists that exposure to lead in older houses causes neurodevelopmental abnormalities. Damp, cold, and moldy houses have been associated with asthma, chronic respiratory illnesses, recurrent headaches, fever, nausea and vomiting, and sore throats [16]. Exposure to dust, allergens, and toxic chemicals found in old and dirty carpeting has been associated with allergic, respiratory, neurological, and hematological illnesses. Structural defects can lead to pest infestation, which can trigger asthma attacks. Poor ventilation resulting in high nitrogen dioxide levels has been linked to asthma symptoms [16].

Studies have also found that features of substandard housing—including lack of clean water, absence of hot water for washing, ineffective waste disposal, intrusion of disease vectors such as insects and rats, and inadequate food storage—contribute to the spread of infectious diseases such as tuberculosis and respiratory infections [16].

It is well established that certain features of substandard housing are associated with injuries, including burns and falls. Exposed heating sources, unprotected upper-story windows, low sill heights, slippery surfaces, breakable window glass, and poorly designed stairs can lead to injury and falls. In addition, outdated wiring and building materials found in many older houses are fire hazards [16].
Housing plays a key role in all of our lives. It impacts our health, education, employment, recreation, and social opportunities. For people with intellectual and/or developmental disabilities (I/DD), the creation of accessible community housing is critical. The Arc of North Carolina, which provides services and advocacy for people with I/DD, has been developing new models of housing for people with I/DD for more than 35 years. Over that period, the design of those housing models has evolved, based on principles of self-determination that support people with I/DD to become more involved members of their communities.

Housing for people with I/DD has shifted from large institutions to smaller group homes to more individualized models. Two of the largest barriers to independent living are cost and available support services. People with disabilities receiving Supplemental Security Income are among North Carolina’s lowest-income citizens, and they are priced out of the traditional housing market. The choices that are affordable on their income are often unsafe and inaccessible. Therefore they often remain at home with family or are forced into more restrictive settings. In addition, for people with I/DD, affordable housing itself is not enough. Because their disability is lifelong, appropriate services must be consistently available to support them in living in their own homes.

In an effort to address these needs, The Arc of North Carolina has developed more than 240 supportive-housing projects for people with I/DD, while advocating for support services that meet individual needs. Serving more than 1,500 people, these residences are operated in partnership with local service providers and range from group homes with 5-6 residents, to small apartment buildings, duplexes, and condominiums. The Arc Rowan Apartments and High Point Condominiums are 2 examples of creative options that allow people with disabilities to choose the least restrictive settings possible and realize their housing dreams.

The Arc Rowan Apartments consist of 2 scattered-site quadruplexes for people with I/DD in Salisbury, North Carolina. Each newly constructed building looks like a single-family home and blends in with the neighborhood. One apartment is accessible for a tenant who uses a wheelchair and another is accessible for someone with a visual impairment. A unique feature is the central living space. Each apartment has both an exterior entrance and an entrance to the common area, which includes a laundry room and a furnished living room; residents also share a front porch and a backyard patio. One of the biggest fears of independent living for people with I/DD is social isolation, so this unique design offers not just the privacy of an apartment, but also space for socializing, networking with peers, and mutual support.

In addition to constructing new housing, The Arc of

Finally, substandard housing can negatively affect mental health. A study has shown that damp, moldy, and cold indoor conditions are associated with psychological disorders such as anxiety and depression. Other studies have found that substandard housing is linked with social isolation among children and with lower levels of self-esteem and life satisfaction among both homeowners and renters [17].

Conclusion

It is clear from this brief review that housing affordability, overcrowding, and substandard housing have important effects on both physical and mental health. So, how can public health and city planning professionals work together to address those problems before they make people sick? One overarching strategy would be to form local and statewide healthy housing advocacy coalitions that could bring public health professionals, planners, and other interested parties together to develop action strategies [13]. Based on assessments of local conditions, these coalitions could advocate for the adoption of a policy requiring health impact assessments for all proposed development. They might also advocate for programs that would assist residents in identifying and correcting home health hazards. In addition they might advocate for revisions to building and housing codes (to make them better reflect current knowledge of what constitutes healthy housing) and for better enforcement of those codes. Finally, housing and health coalitions could lobby at all levels of government for more funding for affordable housing programs so that fewer households would have to compromise their health to put a roof over their heads.

References

North Carolina has also purchased and renovated numerous condominiums and duplexes at scattered sites. In High Point, The Arc purchased 4 2-bedroom condominiums in established, safe developments to provide supporting housing for up to 8 people with l/DD. In order to facilitate integration and participation in community activities, the condominiums are located on a bus line and are close to employment, recreation, shopping, and services. The Arc renovated the condominiums to be energy efficient and made 1 of the units wheelchair accessible.

The Arc Rowan Apartments and High Point Condominiums do not have live-in staff, but tenants receive various services based on their individual needs from a provider of their choice. These services may include assistance with finding employment, budgeting and paying bills, planning menus, preparing food, shopping, maintaining a safe environment, and other activities of daily living. Although these services are not a requirement of tenancy, these supportive and skill-building services are essential for people with l/DD to be able to maintain themselves in independent housing.

Financing for these projects was provided by a combination of federal, state, and local resources. The Arc Rowan Apartments were funded in part by the US Department of Housing and Urban Development Section 8, and both projects received funding from the Housing 400 Initiative of the Supportive Housing Development Program administered by the North Carolina Housing Finance Agency and the North Carolina Department of Health and Human Services. The City of High Point also contributed to the funding for High Point Condominiums. Ongoing operating subsidies are essential to making these apartments affordable for people with disabilities.

Having a home of one’s own is an important value in our society, and the tenants of The Arc Rowan Apartments, High Point Condominiums, and similar projects are thriving in their new roles as tenants, neighbors, and community members. With these new roles have come not only newfound independence, but also increased self-esteem. As Terry, a young man who lives in 1 of the apartments, told us:

I am able to be more independent now that I have my own place and I can do things for myself. I have learned how to use my stove and have opened up a bank account. I would not have been able to afford to move into another place because it would have been too expensive.  


Acknowledgment
Potential conflicts of interest. D.R. and N.K. have no relevant conflicts of interest.

Electronically published October 12, 2012.

Address correspondence to Mr. Dave Richard, The Arc of North Carolina, 343 East Six Forks Road, Ste 320, Raleigh, NC 27609 (drichtad@arcnc.org).