

Housing and Health: Beyond Disciplinary Confinement

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ABSTRACT *There is a need for innovative research on housing and health. In contrast to traditional disciplinary studies, which are sector-based, interdisciplinary and transdisciplinary contributions offer a broader approach. Interdisciplinary approaches highlight the difference between a biomedical model that often adopts a symptom-treatment interpretation of housing and health and a holistic or integrated model that combines biological, cultural, economic, political, psychological and social factors in a new way. This article illustrates the pertinence of interdisciplinary contributions to develop a more holistic understanding of housing density and how it can be interpreted to understand the complex relationship between housing conditions and health status.*

KEYWORDS *Density, Housing, Human ecology, Interdisciplinary*

INTRODUCTION

Housing conditions are an important determinant of quality of life and well-being.¹ The multiple components of residential environments, including outdoor areas, should be considered in terms of their potential and effective contribution to physical health, and social and psychological well-being. Empirical studies show that, in principle, at least eight main components of residential environments ought to be considered including:

1. The characteristics of the site in ensuring safety from “natural” disasters including earthquakes, landslides, flooding and fires and protection from any potential source of natural radon.
2. The residential building as a shelter for the inhabitants from the extremes of outdoor temperature; as a protector against dust, insects and rodents; as a provider of security from unwanted persons; and as an insulator against noise.
3. The effective provision of a safe and continuous supply of water that meets standards for human consumption and the maintenance of sewage and solid waste disposal.
4. Ambient atmospheric conditions in the residential neighbourhood and indoor air quality both of which are related to emissions from industrial production, transportation, fuels used for domestic cooking and heating, as well as the local climate and ventilation inside and around buildings.

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5. Household occupancy conditions, which can influence the transmission of airborne infections including pneumonia and tuberculosis, and the incidence of injury from domestic accidents.
6. Accessibility to community facilities and services (for commerce, education, employment, leisure and primary health care), which should be affordable and available to all individuals and groups.
7. Food safety, including provision of uncontaminated fresh foods that can be stored with protection against spoilage.
8. The control of vectors and hosts of disease outdoors and inside residential buildings, which can propagate in the building structure; the use of non-toxic materials and finishes for housing and building construction; the use and storage of hazardous substances or equipment in the residential environment.²

Empirical studies during the 1990s, however, confirm that the relations between residential environments and health are not limited to the above eight sets of components. In addition, housing conditions can be considered in terms of their capacity to nurture and sustain social and psychological processes that enable well-being.³

If housing and the built environment are considered too narrowly, then the interrelations between housing, health and well-being may not seem important. Today we know that the physical condition of housing units should be examined with respect to housing tenure, household composition and income, availability and cost of building materials, infrastructure and services, levels of education, and employment status of residents.⁴ These dimensions of housing environments and the health of residents cannot be isolated from their diet, lifestyle, employment conditions and the availability of health care.⁵

Studies in several industrialized countries show that more than half of all non-sleep activities of employed people between 18 and 64 years of age occur inside housing units: Children, the aged and housewives spend even more time indoors.⁶ Consequently, any shortcomings in the indoor residential environment (including high housing density) may have implications on human health and well-being.

This article stems from recent criticisms of mainstream empirical research on housing and health.⁷ It requests and illustrates a different kind of contribution. It illustrates this kind of approach by a synthesis of studies of housing density by researchers working in different disciplines and professions. The example of housing density shows the pertinence of complementing common disciplinary contributions by others that are interdisciplinary.

DEFINITIONS AND INTERPRETATIONS

Today there is no widely shared consensus about the nature of the relationship between health status and domestic living conditions.^{8,9} Some reasons for this lack of consensus include the environmental, geographical and temporal complexity of the subject, as well as the diversity of ethnic, occupational, and other social groups living and working in residential neighborhoods. Furthermore, current disciplinary interpretations of health (including a variety of theoretical and methodological approaches) are atomistic interpretations of complex, systemic realities.¹⁰ Therefore, this article argues that conceptual clarification and theoretical development are necessary.

Disciplinary, Interdisciplinary and Transdisciplinary Contributions

In this article, ‘disciplinarity’ refers to the specialisation of academic disciplines that became strong during the 19th century.¹¹ ‘Multidisciplinary’ refers to research in which each specialist remains within her/his discipline and contributes using disciplinary concepts and methods. Interdisciplinary contributions can be interpreted as the bringing together of disciplines that retain their own concepts and methods that are applied to a mutually agreed subject. In these studies one contributor will usually co-ordinate the research process and seek integration. Interdisciplinary contributions can be considered as the mixing together of disciplines. Transdisciplinary contributions involve a fusion of disciplinary knowledge with the know-how of lay-people that creates a new hybrid that is different from any specific constituent part.¹² This interpretation means that transdisciplinarity is not an automated process that stems from the bringing together of people from different disciplines or professions. In addition, it requires an ingredient that some have called “transcendence.” It also implies the giving up of sovereignty over knowledge, the generation of new insight and knowledge by collaboration, and the capacity to consider the know-how of professionals and lay-people. Collectively, transdisciplinary contributions enable the cross-fertilisation of ideas and knowledge from different contributors. They can lead to an enlarged vision of a subject, as well as new explanatory theories.¹³ Both interdisciplinary and transdisciplinary contributions are ways of improving knowledge. They are essential if our current understanding of the interrelations between health and housing is to be improved.

Multidisciplinary, interdisciplinary and transdisciplinary contributions are complementary rather than being mutually exclusive. It is important to stress this complementary nature because without specialised disciplinary studies there would be no in-depth knowledge and data. The interrelations between these approaches ought to be more systematic than they have been in studies of housing and health. To date, disciplinary research has dominated. There still are too few interdisciplinary contributions about health and residential environments, and transdisciplinary contributions are even rarer.¹⁴

Residential Environment

Housing is meant to address basic human needs for shelter and security by providing protection against climatic conditions (excessive heat and cold) and unwanted intrusions from insects, rodents and environmental nuisances (such as noise) that may be harmful for health and well-being. Housing contains household activities and possessions. Turner¹⁵ made the important distinction between housing as a noun and housing as a verb.

According to Turner, housing can be considered as a product (from an individual housing unit to the housing stock in a neighbourhood or city). He also suggested that housing can be considered as a process by referring to the provision and maintenance of all kinds of residential buildings either by public authorities or private initiatives. Turner’s interpretation of housing implies that researchers and practitioners should consider the multiple interrelations between housing conditions and human processes in precise localities. It emphasises that cultural, social, economic, political and individual human factors should be considered simultaneously at the geographical scale of the housing unit, the residential building (with one or more housing units) and its site and conditions in the local neighbourhood. Hartig and Lawrence¹⁶ have

used the term “*the residential context of health*” to refer to all those dimensions that define the interrelated nature of housing and health.

An Ecological Perspective for Interdisciplinary Contributions

There are important conceptual and methodological questions that need to be examined if the interrelationships between housing conditions and health status are to be considered from a broad perspective.¹⁷ This kind of perspective implies that an analysis of the interrelations between multiple components of any human ecosystem is necessary. Systemic interpretations of human illness, health and local environments have a long history. They can be traced back as least as far as the Hippocratic treatise “*On Airs, Waters, and Places*” published initially about 2,600 years ago.¹⁸

The term “ecology” derives from the ancient Greek words “*oikos*” and “*logos*” and means “science of the habitat.” It is generally agreed that this term was used first by Ernst Haeckel (1834–1919), a German zoologist, in 1866. The word ecology designates a science that deals with the interrelationships between organisms and their surroundings. Since the late 19th century the term “ecology” has been interpreted in numerous ways. For example, in the natural sciences, botanists and zoologists use the term “general ecology” to refer to the interrelations between animals, plants and their immediate surroundings. Human ecology explicitly deals with people–environment relations.¹⁹

The ecological perspective considers four main sets of interrelated factors: *the individual*, who has a specific genetic code with a susceptibility and immunity to illness and disease, as well as lifestyle traits; *the agent or vector* of illness and disease, including not only bio-geo-physical components of the environment but also the social and psychological dimensions of human settings; *the physical and social environment* of the individual, which affects the susceptibility of the host, the virulence of bio-physical agents, and the exposure, quantity and nature of the contact between host and vector; *the available resources* used by the individuals and households including housing, nutrition, money, information, and access to health and medical services that ought to be affordable for all groups of the population.

The distinction between biomedical models and ecological interpretations of health is fundamental.²⁰ The germ theory, for example, is an incomplete explanation of human illness and disease because it ignores the contribution of numerous physical and social dimensions of the environment that can impact on health. Ecological interpretations maintain that the presence of a germ is a necessary but not a sufficient condition for an individual to become ill. They accept that some individuals become more susceptible to certain illnesses because of their differential exposure to numerous environmental, economic and social factors that can promote or be harmful to health and well-being. This interpretation does not ignore the influence of genetics, individual behaviour or primary health care. However, it maintains that, alone, these do not address possible relations between social problems and illness (e.g., inequalities) or positive social dimensions and health promotion (e.g., public education). The distinction between potential and actual health status can be the foundation for a new interpretation of health that includes the way ecological, social and psychological factors transgress traditional disciplinary boundaries in the health and housing sectors.

POPULATION DENSITY AND HEALTH: BEYOND DISCIPLINARY BOUNDARIES

Studies of human population density have a long history including Malthus's²¹ thesis about the relation between available food resources and population size. In the 19th century, there was also a widely shared concern about the propagation of contagious diseases in densely populated residential areas.²² From the 1920s, empirical studies at the Chicago School of Sociology interpreted population density as a causal explanation for the incidence of social ills, including crime and violence, in urban neighbourhoods.²³ The early studies at the Chicago School of Sociology plotted the geographical distribution of some characteristics of the resident population of Chicago, including their ethnic origin, socio-economic status, birth and mortality rates, delinquency, mental and other illnesses. These contributions enabled the authors to overlay the maps of these characteristics in order to identify those that occurred in the same urban area. This approach identified the correspondence between incidences of tuberculosis with the highest incidence of delinquency.

Contributions of Environmental Psychologists

In the social sciences, the distinction between population density and crowding was made and has been widely accepted.²⁴ However, this distinction is still not often used in the medical or public health sciences, and the two terms are still used interchangeably. In contrast, in environmental psychology Stokols²⁵ initiated an important theoretical contribution. He distinguished between the physical condition of the population density, that is the number of persons in a given spatially demarcated area, and the subjective experience of crowding, an appreciation that varies according to cultural customs and values, the societal context of everyday life, and the experience, coping strategies and preferences of individuals. In principle, measurements of high density are not a determinant condition for crowding.

The innovative contribution by Stokols led other environmental psychologists in the 1970s to identify some typologies of population density. One basic typology concerned how population density could be modified in a specific location.²⁶ It is possible to increase density by increasing the number of people without changing the amount of space they occupy. This has usually been referred to as social density. Alternatively, density can be increased by keeping the number of people constant while reducing the amount of space they occupy. This is often referred to as spatial density. Although both these mechanisms for changing population density could have impacts on health and well-being (for reasons that will be explained below) this contribution from environmental psychology has not been recognised by medical and public health researchers.

Another typology of population density stems from the types of spatial unit of analysis. For example, at the micro-level, population density inside the housing unit can be measured in terms of persons per square metre or per habitable room. At a larger scale, the population density of a neighbourhood, a city, a region or a country can be measured in terms of persons per square kilometre. This customary approach has led some authors to use the terms internal and external density in residential neighbourhoods.

In an overview of studies of population density and crowding, Baum and Paulus²⁷ conclude that the overall results of experimental studies of the relation between urban density and crowding are not conclusive. The authors present an

interesting discussion of the methodological limitations of a large number of contributions on this subject. It is noteworthy, for example, that many more studies have been completed in prisons and other institutional buildings rather than in residential neighbourhoods.

Contributions of Epidemiological Studies

Empirical studies about housing population density and ill-health can be classified into two main classes. The first includes those studies of the relationship between measurements of population density in defined geographical areas and indirect accounts of health status (such as visits to a doctor or hospital admissions). This approach has a long history in the field of medical geography, beginning in the 19th century in Britain.²⁸ It enables the spatial distribution of the incidence of illness or mortality to be mapped and interpreted in terms of certain variables. However, this kind of contribution does not identify whether household or neighbourhood densities are correlates or root causes of ill-health. Following a review of contributions of this kind, Kellett,²⁹ a medical professional, concluded that “the relation between crowding [sic] and mortality remains uncertain and there is little evidence to relate it to individual diseases.”

The second approach includes those studies of individual’s housing conditions and their relation to measurements of either objective or subjective assessments of ill-health. This approach uses the individual as the unit of analysis, but it often ignores the cultural and geographical context in which that individual lives. It usually does not distinguish between household population density (an objective calculation of the person-to-room ratio) and crowding (the subjective assessment of specific household occupancy conditions). Studies show that these assessments can vary significantly between people with different cultures and between people in the same society at the same time. Hence age, gender, and socio-economic status need to be addressed.³⁰

A survey in West London among a representative sample of British women aged 25 to 45 years found a significant relation between household population density and psychological distress reported by women.³¹ Both very low and high household population densities were correlated with psychological ill-health. These relations remained even when employment status, presence of children, social class and residential satisfaction were controlled. Possible explanations are found in contributions by environmental psychologists about personal control and privacy regulation: For example, loneliness and lack of control of the desired amount of interpersonal interaction with other members of the household can be detrimental to psychological well-being.³² Recent studies show that privacy regulation, the sense of insecurity and access to communal amenities may promote mental and physical health.³³

Integrating Epidemiological, Psychological and Sociological Interpretations

Housing occupancy conditions, specifically the number of persons per habitable room, can be analysed by survey methods that address cultural, social and psychological variables in conjunction with those biological mechanisms that are responsible for the human-to-human transmission of infectious diseases. These

biological mechanisms can be summarised from a report by the United Nations Commission on Human Settlements:³⁴

1. High household population density increases the risk of multiple infections because the number of potential transmitters is increased. Consequently, if there are many persons per room, then the inhabitants will tend to have more infections than if there were lower numbers of persons per room.
2. High household population density increases proximity of people and the risk of disease transmission because not only the number of vectors, but also the close contact may be a necessary condition for the human-to-human transmission of infectious diseases. Proximity can be measured in terms of the number of persons per habitable room, the floor area per person, or the number of persons sleeping in the same bed.
3. Housing occupancy conditions may affect the severity of the infection and the case fatality ratio because high household population density increases the risk of infection early in life. Infections early in life are one determinant of the severity of a disease.
4. Housing occupancy conditions affect the risk of prolonged intensive exposure to infections and, therefore, the severity of infection and the case fatality ratio. Given that high household population density influences the risk of contracting an infectious disease in the household, the number of susceptible individuals per household is an important risk factor for morbidity and mortality.
5. Housing occupancy conditions can increase the risk of the long-term negative impacts of infections, especially childhood diseases such as measles. A high household population density is a key risk factor because long-term excess morbidity and mortality are related to the intensity of exposure during acute infection, being highest among children who contracted diseases at home at a young age at the time of exposure.

Another thesis that should be considered is that a high household population density can be beneficial for health and well-being because infections that do not require medical treatment stimulate the immune system against viral infections and, therefore, reduce the risk of morbidity and mortality from acute diseases. However, there is a correlation between post-neonatal infant mortality rates and habitable floor space per person in those countries that have available data. Furthermore, a study of childhood tuberculosis in New York City found that there was a relation between the incidence of this disease and household population density in the Bronx, such that children living in overcrowded housing were six times more likely to develop active tuberculosis than their neighbours.³⁵

Field Study in Guinea Bissau

One example of the application of the above principles is a field survey of housing occupancy conditions and the health status of residents conducted in Guinea Bissau from 1993 to 1995 in order to identify and measure epidemiological relationships (based on statistical significance) between house population density and the health status of children less than three years old and of pregnant women. The hypothesis was that higher household population density increases the risk and severity of ill-

health by the transmission of communicable diseases in the household. According to the United Nations Commission on Human Settlements:

Overcrowding has usually been measured by the number of individuals of all ages per room—not the most adequate way of measuring potential negative crowding [sic]. For certain infections, it may be the number of individuals in susceptible age groups which is important, rather than the total number of individuals in the household. Therefore, it could be relevant to consider crowding [sic] for certain specific age groups. Space per person and the number of persons per bed may also be indicators of overcrowding, since they are connected with proximity and risk of transmitting infections.³⁶

The results of the field survey show that when social, economic and ethnic variables are controlled, household population density is a significant determinant of post-perinatal infant mortality even when there is a high level of control for communicable diseases (such as measles, diphtheria, polio, whooping cough and tuberculosis). Other predictors of high mortality were the level of formal education of the mother, the gender of the child, ownership of domestic pigs, immunisation, an internal bathroom in the house and ethnicity-based behavioural customs, including the duration of breast feeding.

The study in Guinea Bissau also shows that the level of formal education of mothers and immunisation coverage are preconditions for good health that warrant a higher priority than improved housing conditions in health promotion campaigns. One reason for this is that ethnic differences in the resident population are reflected in behavioural differences related to household hygiene and nurturing infants. Another reason is that different levels of household population density are pertinent for the transmission of different types of infectious disease. Therefore, technical interventions can be more appropriate than other kinds of interventions in some situations. Finally, the study suggests that interventions to improve health are dependent on the cultural context of each intervention. Various means and measures will only be implemented successfully if an understanding of the cultural context is integrated into the intervention process.

CONCLUSION

Many behavioural, biological, cultural, economic, social, physical and political factors need to be considered if a comprehensive understanding of housing density and health is to complement disciplinary and sector-based interpretations. Both objective, quantifiable measures and subjective, qualitative assessments are necessary. This article has discussed and illustrated an interdisciplinary interpretation of health and housing, especially housing population density, using contributions from several disciplines and professions in a complementary way. Beyond disciplinary knowledge and expertise, interdisciplinary and transdisciplinary contributions are fruitful for addressing all complex subjects. Their future applications are an important challenge for housing researchers and the health scientists.

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