## Housing as a Determinant of Health 2

# Housing at the intersection of health and climate change

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**Anthropogenic climate change is causing rapid shifts in temperature and weather patterns, both in location and intensity, making living conditions increasingly hazardous. This complicates housing's frontline role in protecting human health. When housing systems fail to provide universal access to secure, affordable, and suitable housing, social and health inequalities related to climate change are amplified. The location, construction, and operation of homes influence greenhouse gas emissions and must be improved to reduce their environmental impacts. This paper, the second in a Series on housing as a social determinant of health, builds a framework for conceptualising the interactions between housing, climate, and health. It identifies the pathways through which climate change affects housing and exacerbates health risks, and reflects on policy responses for climate resilience in housing and health.**

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This is the second in a Series of two papers about housing as a determinant of health

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## Introduction

Climate change has heightened the challenge for housing to protect and support health. Globally, human populations are increasingly exposed to climate-related environmental hazards, many of which are experienced in residential settings.[1,2] These climate impacts greatly affect human lives and health, with exposures to extreme heat and cold, wildfires, floods, droughts, and air pollution contributing to increased rates of mortality; respiratory, cardiovascular, and infectious diseases; and mental illness.[3] As a key social determinant of health at the frontline of climate change impacts, housing can either prevent or exacerbate health risks and inequalities.[4,5] WHO has positioned housing as an increasingly critical health risk factor.[1] Housing policy is recognised as an underused leverage point for public and global health interventions.[6] In this paper, we focus on the intersection of housing and health with climate change.

Housing as a system shaped by social, political, and commercial contexts is central to addressing the health impacts of climate change, and to climate adaptation and mitigation responses. Climate change disrupts human settlements and housing systems, reshaping housing landscapes and reinforcing housing's welfare role. Climate change can distort both demand and supply in the housing markets. Extreme weather events, such as floods, drive an immediate demand for more resilient and less vulnerable housing in both affected communities and for low-risk areas. This disruption in the housing market can have widespread consequences on housing security, affordability (eg, house price, insurance, and cost of repairs and upgrades), suitability, and home environments that have a broader effect on the population. These elements of the housing system ultimately establish the extent to which housing moderates and mediates the health impacts of climate change.

Climate change acts as a multiplier, intensifying the health risks of poor housing,[7] and housing disadvantage (unaffordability, unsuitability, insecurity, and health harming home environments) exacerbates the harm caused to health by climate change. Poorly housed or unhoused people disproportionally experience the effects of overheating, air pollution (eg, wildfire smoke), and floods, both within and across nations.[7–9] People living in poor housing conditions with inadequate insulation or cooling systems are at an increased risk of heat-related illness during heatwaves,[4,8] and those in homes with existing structural defects face increased health risks, such as fungal infections resulting from contaminated air and water after floods.

In turn, housing contributes to climate change, as both construction and operation add substantially to carbon emissions. The extent of this contribution depends on the size, form, function, and geographical location of dwellings, through embodied and operational carbon.[10] International reports, such as those by the Intergovernmental Panel on Climate Change (IPCC),[3] point to the savings in greenhouse gas emissions that might be achieved by housing improvements. Housing is a key contributor to stabilising the atmosphere, mitigating climate change hazards, and protecting human health.

The role of housing in the broader context of climate and health is therefore multidirectional. It operates both through housing-related emissions and exposures that assuage or amplify the impact of climate on health. In some cases, these interactions can further exacerbate climate change—eg, if poorly ventilated houses overheat and require mechanical cooling. Thus, through a range of mechanisms, housing offers an opportunity to mitigate the destabilisation of the climate, support human health and wellbeing, and provide a foundation for thriving and connected communities.

The aim of this Series paper is to apply and extend the framework for housing as a social determinant of health to interrogate and map the intersection of climate change, housing, and health. As health vulnerabilities and inequalities driven by climate change continue to rise, it is crucial to understand the role of housing, both as downstream and upstream determinants of health and health equity, and to locate these relationships within

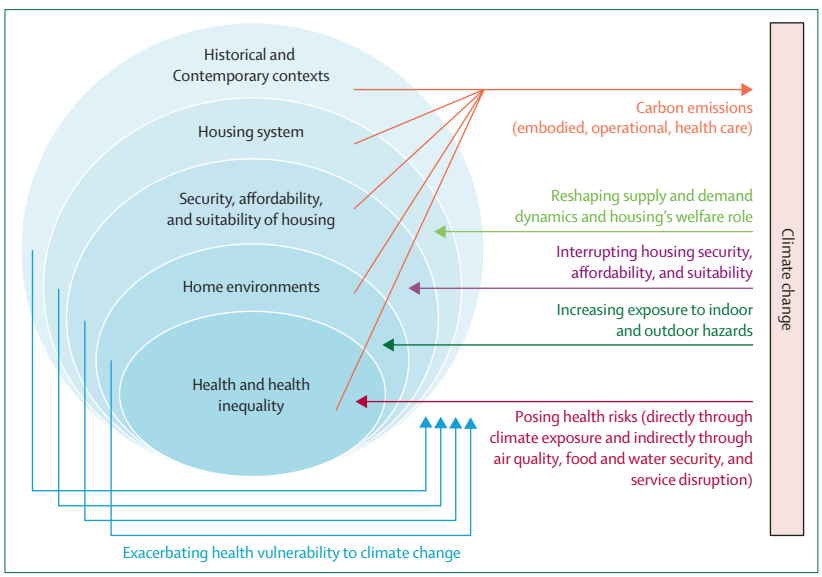


*Figure 1:* **Housing as a social determinant of health vulnerability to climate change**

the science of our changing climate and the challenges posed for developing strategies to protect human health in response.

## A climate-informed framework for housing as a social determinant of health

Drawing on the framework for housing as a social determinant of health, described in the first paper of this Series,[11] the interconnection between housing, health, and climate change is examined through upstream and downstream determinants, from historical and contemporary contexts, housing systems, and housing pillars (security, affordability and suitability), to home environments (figure 1). In the pathway between housing and health, climate change is situated within the broader historical and contemporary contexts that shape the housing system and its ability to provide secure, affordable, and suitable housing and healthy home environments. These housing elements, through the confounding effects of household characteristics and geographical contexts, influence the health and wellbeing of inhabitants. In the pathway between climate change and health, various housing elements are affected by climate change, amplify its health impacts, and contribute to climate change.

Drawing from these connections, our conceptualisation of housing as a social determinant of health vulnerability and resilience to climate change is outlined in our proposed framework in figure 2.

## Historical legacies and contemporary contexts at the global, regional, and local levels

Anthropogenic emissions of carbon dioxide and other greenhouse gases, notably methane and nitrous oxide, are the main drivers of climate change.[3] In 2024, historical emissions from early industrialisation to the present system of economic production and mass consumption had caused global average temperatures to rise by an estimated 1·47°C above preindustrial temperatures.[12] The future rate of change of global temperatures will depend on how quickly the global economy is decarbonised.[3]

Social inequalities and housing vulnerabilities resulting from historical and contemporary policies deprive societies and groups of the resources needed to meet the challenge of climate change.[13,14] Histories of capitalism, colonialism, and global inequalities in income, labour capability, and capital stocks have left groups subject to legacies of expropriation and dispossession (eg, people of lower socioeconomic status or from lower-income countries) with reduced capacity to adapt and increased vulnerability to the health harms associated with the changing climate.[4] Financialisation of housing since at least the 1980s has directed capital flows to inflate housing prices and enabled housing as a mechanism of wealth accumulation.[15] This political–economic process weakens adaptive capacity, undermines the welfare role of housing, and siphons away meaningful investment in other domains of the economy such as green transitions and climate resilience.

Beyond the inequalities of income and wealth characteristic of almost all societies, sexism, racism, and unequal investment in communities continue to influence access to, and the suitability of, housing for marginalised ethnic, indigenous, racial, and gendered groups.[16,17] Unjust historical housing and urban policies and practices, such as discriminatory lending and exclusionary zoning, have been linked to the problems of increased exposure of inhabitants to climate hazards and deteriorated housing conditions that are less resilient to harmful exposures.[18,19] Women have historically been denied access to land and housing through laws and attitudes rooted in patriarchal systems, which continues to reduce their adaptive capacity.[4,20]

The rapid expansion of urban areas since the mid-20th century and the resultant path dependencies, most salient in countries that favoured suburbanisation and car-dependent infrastructure, has accelerated climate change through geographically dispersed development, increased energy consumption, and biodiversity loss,[21] and has negative effects on health.[22] Without due care, marginalised groups could be displaced by uneven urban environmental improvement,[23] creating new and deeper vulnerabilities and inequalities in urban greening and decarbonisation.[14]

In a 2023 IPCC report, the concept of climate-resilient development is promoted, where strategies to adapt to climate change and actions to reduce emissions are combined.[3] The need to include equitable improvements in health and wellbeing that overcome the legacies of historical and contemporary disadvantage for effective policy action has been made explicit. For example, by

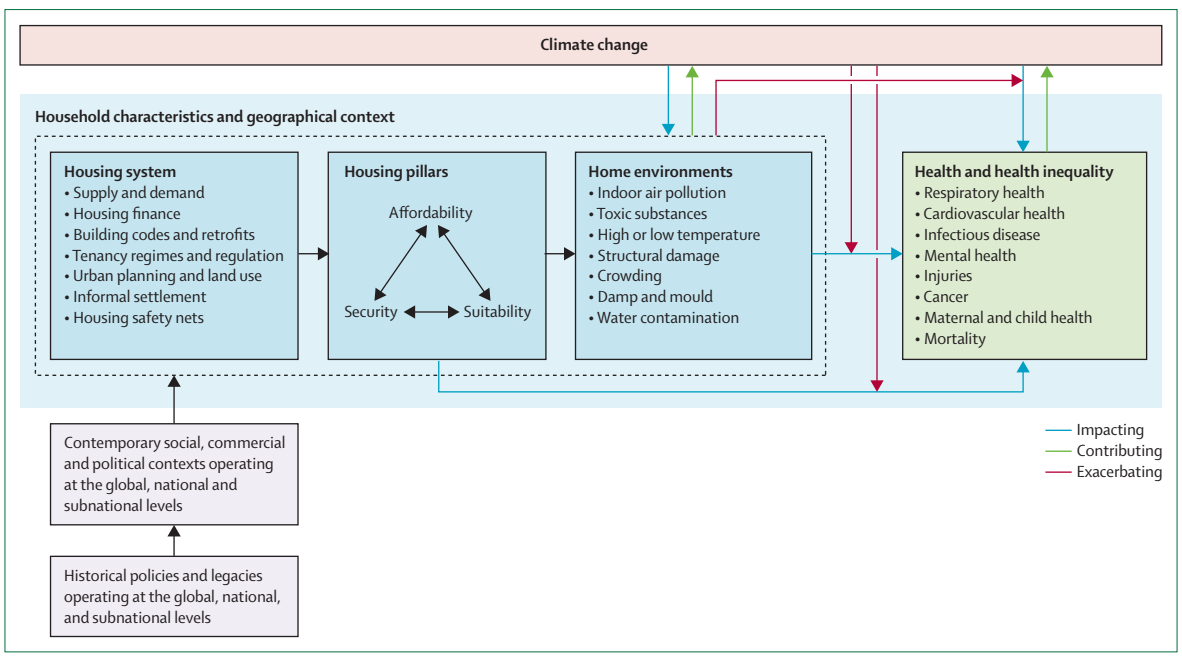


***Figure 2:*** **A climate-informed framework for housing as a social determinant of health**
The figure shows the intersection between housing, health, and climate change. The black arrows signal the nested relationships between historical and contemporary contexts, housing elements (as indicated in the dotted box), and internal relations between housing elements. The coloured arrows indicate the pathways between housing, health, and climate change.

alleviating poverty and hunger, improving population health and livelihood, and providing clean energy and water, communities are better positioned to be more climate resilient.

## Housing system

Climate change is affecting the operation of housing systems globally, from supply and demand dynamics to regulations around land use and existing and new buildings, requiring both mitigation and adaptation responses. When developing housing-focused climate change strategies to protect health, attention should be paid to building qualities that promote health and climate resilience; urban planning and transportation systems that support sustainable and healthy living; housing supply and density that enables adequate emergency, social, and affordable housing stock; and regulations and programmes that establish minimum housing standards and security to provide a safety net and protect vulnerable populations. This shift in prioritising health and climate resilience requires reducing the tendency towards policies of reactive adaptations and selective securitisation that protect privileged groups,[24] and developing policies cognisant of social movements that advocate for housing and climate justice, to redress inequalities from historical and contemporary policies.

### Supply and demand dynamics

Housing policies that worsen affordability, such as restrictive land use that reduces supply, insufficient social and affordable housing stock, and investment property tax benefits, exacerbate inequalities and increase people's vulnerability to climate-related hazards.[25] Climate change is reshaping both the locations and types of housing people seek, greatly influencing housing demand. House prices are discounted in high-risk locations in the short or long term,[26] and demand increases for resilient housing and housing in low-risk locations.[27] There is also evidence of growing demand for energy efficiency improvements in housing, which is reflected in the sale prices and rents of energy-efficient residential properties.[28] Leaving targets for housing supply to the market, without regulatory intervention or non-market social and crisis housing alternatives, limits the availability of and equitable access to climate-resilient housing for priority populations.

### Finance and insurance

Climate change poses a financial risk to insurance markets and the broader financial system. Acute and chronic climate hazards increase the need for retrofitting and repairs and alter the property insurance landscape through increased insurance premiums and reduced coverage.[26] In areas at heightened risk of climate hazards, market failure in the provision of accessible insurance puts residents who are unable to purchase coverage due to restricted availability or unafforadable premiums at increased financial risk,[29] which affects property values, investment sentiment, and lending practices of financial institutions.[30] Meanwhile, financial

market support for housing decarbonisation through sustainable housing finance instruments, such as green mortgages, energy efficiency loans, and green bonds, has the potential to reduce carbon emissions, increase indoor air quality, and improve resource efficiency, contributing to climate change mitigation, adaptation, and a circular economy.[31] Green finance can enable sustainable outcomes when there is a focus on long-term investment and regulatory frameworks that mandate transparency and standards to prevent greenwashing.[32]

### Building codes, retrofits, and decarbonisation

Building codes, which are standards and regulations governing the design and construction of new buildings, are fundamental to assuring the protection and support of safety, health, and wellbeing of communities from climate hazards. Applying to new construction and major renovations, building codes vary greatly in standards (eg, criteria, data requirements, health consideration, and sustainability) and stringency across jurisdictions.[33] An increasing number of jurisdictions have implemented energy codes since the Paris Agreement in 2015, which are also increasingly complemented with supporting initiatives such as mandatory energy and carbon disclosure and tax incentives for green buildings.[31] Policies on the labelling and certification of energy efficiency for properties and appliances can have positive effects on reducing energy consumption and emissions.[31] Building codes based on historical weather patterns are expected to perform inadequately in terms of temperature regulation, energy consumption, moisture control, and indoor air quality in projected climate conditions.[34]

Since most of the housing stock consists of existing buildings, retrofitting and energy efficiency upgrades are crucial for reducing global energy consumption and greenhouse gas emissions, and for improving the thermal comfort of occupants and indoor environment quality.[35] An increasing number of jurisdictions globally have begun mandating energy or operational carbon performance for existing buildings—eg, the Energy Performance Certificate rating in the UK and the Building Performance Standards in cities across the USA.[36] Government investments in repairing and retrofitting public housing should be a priority, as housing in this tenure is often of poor quality in many jurisdictions, yet provides shelter for people with very low incomes or with complex social and health needs.

Buildings account for 31% of global carbon dioxide emissions, with 50% of those emissions stemming from energy use in residential buildings.[3] Decarbonising building operations (ie, from heating, cooling, lighting, and the use of equipment and appliances) and reducing embodied carbon in new buildings and retrofits (ie, raw material extraction, processing, manufacture, transport, delivery, construction, maintenance, renovation, and demolition) hold substantial potential for climate change mitigation.[37] Interventions and technological innovations have been increasingly implemented to mitigate building greenhouse gas emissions through improving energy use and carbon emissions (eg, envelope upgrades and heat pumps), reducing the demand for energy and resources over the lifecycle of buildings (eg, repurposing existing buildings with low embodied-carbon materials), and lowering the carbon intensity of energy supply (eg, green certificates, renewable or clean energy portfolio standards, or building codes).[3] Energy efficiency measures, when implemented with care, can have co-benefits of lowering health risks, reducing health service use, alleviating fuel poverty, and preventing productivity loss.[8,38]

### Tenancy regulations

In many countries, rental housing is disproportionately of poor quality, energy inefficient, and insecure, and often accommodates low-income households who are more affected by fuel poverty and affordability issues than are high-income households.[36] As climate change intensifies, there is a need for stronger tenant protection, such as minimum rental housing standards including energy standards, thermal resilience, and indoor air quality. Addressing energy efficiency in rental properties is particularly challenging due to split incentives and power imbalance between tenants and landlords. Institutionalisation of strong tenants' rights and government interventions (eg, subsidies for solar photovoltaic and battery systems, incentives for dwelling condition improvement, and mandatory disclosure of energy performance) is required to overcome market failure (from power imbalances, split incentives, and information asymmetries) and raise the baseline for housing quality in the private sector.

### Urban planning and land use

As climate change alters the physical environment, rendering many locations unhabitable or uninsurable, efforts to prepare for these changes should also consider the topographical location of properties, location of resettlement, and land use planning. The density and location of housing contribute to reducing emissions and stabilising greenhouse gases in the atmosphere, and offer health co-benefits and savings for households and economies.[39] Land-use policies that consider curbing development in hazard-prone areas address environmental concerns and health consequences.[40] Furthermore, since the transport sector is a large greenhouse gas emitter, housing located to support sustainable transportation options—such as public transit, cycling, and walking—in accessing jobs, schools, and services provides climate and health benefits by reducing carbon emissions, ameliorating air pollution, and increasing physical activity.[41,42] If done carefully, compact design and planning of residential housing with increased urban greening and active transport can reduce energy consumption and associated emissions, and promote health co-benefits.[39,41]

### Informal settlement

Many urban areas also contend with the challenges of informal settlements. Although varying in physical form, social history, and degrees of maturity and community cohesion, which shape risks associated with climate change and suitable responses from residents, informal settlements are commonly characterised by inadequate housing and limited access to basic services.[43] Worldwide, an estimated 1·1 billion urban residents live in informal settlements or slum-like conditions.[44] Over the next 30 years, with increasing urbanisation, a projected additional 2 billion people could reside in this form of housing.[44] Climate change and extreme weather events are likely to be more deadly and detrimental to health in informal settlements than in formal ones, with women and girls disproportionately affected due to over-representation in slums and the continued feminisation of poverty.[4,20] The UN has identified the importance of upgrading informal settlements to provide housing that is adequate, safe, affordable, and has access to basic services as a key part of the Sustainable Development Goals.[44]

## Housing pillars

Housing pillars are cornerstones of housing systems, comprising security, affordability, and suitability. These pillars are defined by the stability and certainty of occupants' living situations, the ability of occupants to afford housing costs, and a dwelling's capacity to meet the specific needs of occupants. These pillars establish the degree to which home environments expose their occupants to hazards or offer protection against health risks.

### Security

Climate change is reshaping the drivers and patterns of housing security. Globally, weather-related disasters cause the internal displacement of more than 20 million people on average each year.[3] The relationship between climate change, housing mobility, and health is heterogenous, context-specific, and bidirectional.[45] Housing mobility can take the form of planned relocation, voluntary migration, or forced displacement across temporal and spatial scales, as the result of slow or sudden environmental changes or in anticipation of them, and as an act of adaptation or maladaptation.[7,40] Climate migration can result in gentrification, where higher socioeconomic status groups can select locations with better environmental attributes, whereas lower socioeconomic communities are displaced due to rising climate-related costs. Additionally, public investment in climate resilience often raises housing costs,[27] exacerbating health inequalities through differential exposures to hazards.

Housing relocation driven by climate change can cause or aggravate health problems including infectious diseases, non-communicable diseases, food insecurity, and psychosocial conditions, driven by disruption to family and community life, unemployment and income loss, housing insecurity, human exploitation, gender-based violence, social disconnection, and lack of access to services.[4,45] In some cases, housing relocation can protect health through providing diversified livelihoods, remittances, and improved access to food, water, education, and health care.[46] Conversely, climate change can also restrict mobility due to loss of resources and economic barriers,[47] which can leave populations at risk of ill health and livelihood disruption caused by environmental degradation. However, measures that are appropriate to local circumstances, and that draw on local knowledge and technical expertise, can protect communities from the effects of immobility and environmental hazards.[48] These are shown by the achievements of low-income and middle-income countries (LMICs); for example, Bangladesh has taken a lead in promoting flood-resistant housing that protects communities and livelihoods through affordable housing adaptations.[48]

Pre-existing health and housing vulnerabilities increase the risks of climate-related relocations. Low-income renters are particularly vulnerable to displacement and forced moves from climate-related disasters in settings with insecure tenants' rights, low supply of rentals in the market, and poor access to recovery resources, which exacerbates their housing insecurity.[7,49] Migrants, asylum seekers, and refugees are among the groups at heightened risk for the health impact of climate disasters given their high likelihood of relative deprivation, inadequate housing, unstable incomes, difficulty in accessing health services, and poor access to resilience information.[50]

At the extreme, climate change increases the risk of homelessness and marginal housing, resulting from the direct effects of extreme weather events and associated housing damage and financial hardship.[7,51] This risk is further compounded by a growing shortage of affordable housing, which has contributed to a rise in homelessness.[52] For individuals already living without shelter, health disparities are worsened through direct exposure to the elements, and indirectly through interrupted access to health and social services, aggravated by the stigma associated with homelessness.[53] The minimal inclusion of such individuals in climate risk mitigation and response strategies is a problem of democratic representation.[53]

### Affordability

Climate change interacts with housing affordability in numerous ways that aggravate health losses and hamper resilience, with the impacts of climate change creating new challenges and intensifying existing challenges for housing and its effects on public health. First, the effects of climate change reduce the supply of affordable housing. Affordable housing, especially affordable rentals, is more likely to be damaged or lost from the housing stock because of its greater distribution

in hazardous locations, insufficient protective infrastructure, and low structural quality.[54]

Second, climate disasters put a strain on housing payments.[2,7,55] Income loss affects mortgage and rental payments, leading to a substantial increase in housing affordability stress after disasters.[7] Existing housing affordability pressures make people more susceptible to negative health impacts of climate extremes and delays in recovery,[7,56] as these events further heighten mental distress and financial strain, thereby reducing their adaptive capacity to respond, especially when these exposures are compounding and cumulative,[57] as is increasingly common (eg, wildfires followed by severe floods).

Third, climate change drives up costs for maintenance, repairs, and insurance, putting pressure on affordability. Climate change increases building maintenance costs as materials degrade faster and require replacement due to physical mechanisms such as cracks and buckling caused by thermal stress, or heavy winds and storms that strain structures and fastenings.[58] Similarly, surges in the prevalence of climate-related hazards, including floods, wildfires, and severe storms, cause substantial destruction to homes, resulting in expenses on reconstruction, repair, and relocation.[2] Potential for exposure to these hazards is factored into the assessment of insurers and insurance premiums. Insurability gaps have cascading socioeconomic effects, contributing to rising economic inequality.

Finally, energy costs and associated energy hardship rise with extreme temperatures.[8] The costs needed for energy consumption and retrofits to maintain thermal comfort disproportionately affect lower-socioeconomic status households and households in poor-quality housing.[8,58] Climate mitigation strategies in housing such as replacing technologies or processes powered by fossil fuels with electric alternatives, if not chosen carefully, can also increase energy costs.[59]

### Suitability

Housing that is fit for purpose and meets the needs of its inhabitants should address traditional metrics of housing suitability including design, condition, size, and location, to maintain occupants' good health. Climate change expands the role of suitable housing to helping protect human health in the face of climate risks. Housing designed for previous climate states risks causing harm to health if not adapted to changing conditions.[1,58] Suitable housing mediates between climate change and health conditions related to somatic thermoregulation and air quality, such as the risk of renal failure, and cardiovascular and respiratory diseases.[60] Therefore, housing conditions and designs should be adapted for current and future climate-related exposures across various locations. Key features should include flood and wildfire resilience, passive design for energy efficiency, cooling mechanisms, resilient building materials, and improved building envelope properties.

There are often trade-offs between housing adaptations and health risk factors. Mechanical cooling such as air-conditioning has been found to be a protective factor for heat-related mortality and morbidity.[61] However, under certain circumstances, air conditioning can inhibit acclimatisation and physiological and behavioural adaptation.[62] Use of air conditioning is also associated with increased neighbourhood ambient temperatures as the units generate heat and further pump heat from indoor environments outside.[63] These factors can contribute to thermal inequality with those unable to afford air-conditioning subject to negative externality.[63] Trade-offs in adaptation also involve balancing energy efficiency and air quality.[64,65] Tight building envelopes decrease heat transfer, prevent unwanted air infiltration, and improve energy efficiency, allowing for more economical use of cooling and heating units, but poorer ventilation can increase amounts of humidity and mould, which reduce indoor air quality.[65,66]

Location suitability is becoming increasingly important as climate change renders some areas with a high degree of climate hazard exposure unsuitable for human settlement, resulting in either relocation to less exposed regions or the formation of climate ghettos.[67] Land ownership and lower housing costs in high-risk locations attract and effectively trap disadvantaged groups into unsuitable locations.[2,67] The concentration of exposure to extreme heat in socioeconomically under-resourced urban areas is contributing to sociospatial thermal inequality, and increases in heat-related mortality and illnesses in vulnerable populations both in LMICs and high-income countries.[68] Neighbourhood-level characteristics can moderate the effect of climate change on housing suitability; for instance, green space or canopy cover can reduce ambient temperatures and diminish the harmful urban heat islands.[4,8]

### Interaction between security, affordability, and suitability

The housing pillars interact in ways that amplify the health impacts of climate change. Housing affordability is often a trade-off with housing suitability that fails to meet the needs of residents, causing health harm and contributing to insecurity.[51,55] Affordability concerns lead households living in material deprivation to defer use of cooling, exposing residents to high heat conditions that could jeopardise health and life.[69] People with few resources become unhoused, trapped in, or forced to relocate to less suitable housing in high-risk areas that are more affordable for them to rent or purchase but incur many health risks.[2,27] Uneven spatial distribution of climate impacts and public investments in adaptation has the potential to create climate gentrification, reshaping housing geographies (eg, Little Haiti in Miami, FL, USA, and St Kjeld Climate District in Copenhagen,

Denmark), often to the advantage of property investors and higher socioeconomic status at the expense of displaced lower socioeconomic status groups and members of marginalised communities.[2,27]

### Home environments

As the most immediate determinant of healthy housing, home environments are linked to climate change as a contributor, an outcome, and a mediator. First, as a contributor, household cooking, heating, and lighting, with unclean fuels such as rudimentary biomass and coal, release large quantities of greenhouse gases and climate pollutants.[70] About 2·1 billion people use unclean fuels in their homes, with most coming from low-income countries.[71] Solid fuels used for domestic settings contribute to more than half of global black carbon emissions that have a per-unit warming capacity of 460–1500 times that of carbon dioxide.[72] As a major source of anthropogenic methane emissions, natural gas systems remain widespread for use in cooking and heating, even in high-income countries.[73] Physical building characteristics such as insulation, heating systems, and dwelling design, together with household incomes, explain much of the variability in energy consumption.[74] In aggregate, building characteristics also contribute to neighbourhood-level exposure to heat extremes.

Second, climate change can cause deterioration in indoor environment conditions. Extremes temperatures and precipitation compromise air quality conditions through degradation of building materials that generate pollutants.[58] For example, high temperatures can increase the release of volatile organic compounds from paints and varnishes,[75] and combined with specific humidity levels, might increase the risk of indoor mould.[76] Both indoor chemical pollutants and mould exacerbate the health conditions of residents, especially those with allergies and respiratory conditions.[77] Increases in pollen production, driven by climate change, and extreme weather events such as wildfires and dust storms worsen the concentration of outdoor pollutants that can infiltrate the indoor environment.[78] Additionally, floods, storms, and cyclones can cause structural damage and destruction, resulting in excess moisture, prolonged high humidity, water damage, and pooling of water, which expose occupants to indoor toxins and water contamination and increase their risk of allergic and hypersensitivity reactions, respiratory problems, and infectious diseases such as water-borne and vector-borne diseases.[78]

Finally, home environments also mediate the health impacts of climate change. Factors that affect energy consumption and amount of exposure, such as the construction of dwelling elements (eg, foundations, walls, and roofs), choice of building materials, solar orientation, envelope properties, air conditioning system type and functionality, energy efficiency, building age, shade on windows and exterior surfaces, ventilation, and insulation, can be optimised to help reduce health risks.[9,8] For instance, cool roof treatments have been shown to be feasible, effective, and low-cost, reducing indoor energy use and air temperature in LMICs and high-income settings.[79]

## Conclusion

Climate change poses multiple challenges for global health, which necessitates a coordinated mitigation and adaptation response from communities, stakeholders, and policy makers. Housing occupies a pivotal role in this effort, as it can expose individuals to the health impacts of climate change, exacerbate those effects and inequalities, or provide protection against them. Therefore, housing should be part of local, national, and international efforts to protect health and address climate change. Transforming housing from a source of vulnerability into a source of resilience requires system-wide improvements to shape housing security, affordability, and suitability, and ultimately home environments. Leveraging intervention points from the climate-informed framework for housing as a social determinant of health, as outlined in this paper, offers vital pathways to rebalance the unequal social and health impacts of climate change. This transformation requires prioritising a just transition to a low-carbon world through housing policies that avoid selective adaptation and prevent increasing inequities. Positioning housing as a cornerstone of climate adaptation and mitigation enables the advancement of fair and sustainable solutions for both health and climate resilience.

#### Contributors

AL, MT, and RB conceptualised and designed the paper. AL and MT drafted the initial manuscript. All authors contributed to the investigation, interpretation, reviewing, and revision of the manuscript.

#### Declaration of interests

We declare no competing interests.

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