

Impact of Sustainable Construction on Health, Comfort, and Daily Lifestyle of the Urban Poor

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ABSTRACT

Rapid urbanization in developing countries has intensified housing shortages, informal settlements, and unhealthy living conditions for the urban poor. Conventional construction methods often neglect health, comfort, and environmental sustainability, leading to overcrowding, poor ventilation, indoor pollution, and increased vulnerability to climate-related risks. Sustainable construction offers a transformative approach by integrating eco-friendly materials, energy efficiency, water conservation, and climate-responsive design to improve living conditions while minimizing environmental impact.

This paper examines the impact of sustainable construction on the health, comfort, and daily lifestyle of the urban poor, with particular emphasis on low-income urban communities. Using secondary data from global reports, peer-reviewed literature, and documented housing initiatives, the study analyses how sustainable housing interventions reduce health risks, enhance thermal and acoustic comfort, lower household expenses, and improve social well-being. The findings demonstrate that sustainable construction significantly contributes to healthier living environments, economic resilience, and improved quality of life for marginalized urban populations, while supporting Sustainable Development Goals (SDGs) 3, 11, and 13. The paper concludes by highlighting policy implications and recommending inclusive, affordable, and community-driven sustainable housing strategies.

Keywords: - Sustainable Construction, Urban Poor, Health, Thermal Comfort, Lifestyle, Affordable Housing, SDGs.

1. INTRODUCTION

Urbanization has become a defining global trend, with cities absorbing millions of migrants in search of employment and better living conditions. However, rapid and unplanned urban growth has resulted in the expansion of slums and informal settlements, where the urban poor often reside in substandard housing lacking adequate ventilation, sanitation, and access to basic services. These conditions significantly affect physical health, mental well-being, and everyday living patterns.

Sustainable construction has emerged as a holistic approach that integrates environmental responsibility, social equity, and economic viability. Unlike conventional construction, sustainable construction emphasizes resource efficiency, climate-responsive design, use of local and non-toxic materials, and long-term affordability. For the urban poor, such approaches are not merely environmental choices but essential tools for survival, health protection, and dignity.

This paper explores how sustainable construction positively influences the health, comfort, and daily lifestyle of the urban poor, positioning it as a critical pathway toward inclusive and resilient urban development.

2. OBJECTIVES OF THE STUDY

2.1. Health challenges due to conventional housing

This objective aims to understand the health problems faced by the urban poor because of poor-quality housing. Many low-income families live in overcrowded houses with poor ventilation, unsafe materials, and inadequate sanitation. Such conditions lead to diseases like respiratory infections, waterborne illnesses, and heat-related health problems. This study examines how poor housing conditions negatively affect the physical health of urban poor communities.

2.2. Role of sustainable construction in improving health

This objective focuses on how sustainable construction can improve both physical and mental health. Sustainable housing provides better air circulation, natural light, safe building materials, and improved sanitation. These features help reduce illness and create a healthier living environment. Better housing

conditions also reduce stress, fear, and anxiety, leading to improved mental well-being among urban poor families.

2.3. Impact of sustainable housing on comfort and daily life

These objective studies show how sustainable housing improves comfort and daily living. Features such as better ventilation, cooler indoor temperatures, natural lighting, and efficient water use make homes more comfortable. These improvements help people sleep better, work more effectively, and maintain healthier daily routines. The study also looks at how improved housing changes hygiene and lifestyle practices.

2.4. Sustainable construction and poverty reduction linked to SDGs

This objective examines how sustainable construction helps reduce urban poverty and supports Sustainable Development Goals. Energy-efficient housing reduces electricity and water costs, saving money for poor households. Sustainable construction also creates employment opportunities and supports community development. The study connects these benefits with SDGs related to health, poverty reduction, sustainable cities, and climate action.

3. METHODOLOGY

The present study adopts a **qualitative and descriptive research methodology** to examine the impact of sustainable construction on the health, comfort, and daily lifestyle of the urban poor. This approach is suitable for understanding complex social, environmental, and health-related issues where numerical data alone is insufficient to explain lived experiences and policy outcomes.

3.1 Research Design

A **descriptive research design** is used to systematically describe existing conditions related to housing quality, health outcomes, and living environments of low-income urban populations. The study does not involve primary field surveys; instead, it relies on established and credible secondary sources to analyse patterns, trends, and relationships between sustainable construction practices and quality of life indicators.

3.2 Sources of Data

Secondary data for the study is collected from the following sources:

a) United Nations and World Health Organization (WHO) Reports

Official reports published by the United Nations, WHO, UN-Habitat, and UNEP are reviewed to understand global perspectives on housing, health, urban poverty, and sustainable development. These reports provide reliable data on housing-related health risks, environmental conditions, and policy recommendations relevant to sustainable construction and urban poor communities.

b) Academic Journals and Research Articles

Peer-reviewed national and international journals related to sustainable construction, public health, urban studies, and environmental planning are analysed. These sources offer empirical evidence and theoretical insights into the relationship between housing quality, indoor environmental conditions, and health outcomes. Emphasis is placed on studies focusing on low-income housing and developing countries.

c) Case Studies of Affordable and Green Housing Projects

Documented case studies of affordable, green, and sustainable housing projects are examined to understand real-world applications of sustainable construction principles. These case studies highlight improvements in ventilation, energy efficiency, sanitation, and comfort levels in low-income housing, providing practical examples of how sustainable construction affects daily living conditions.

d) Policy Documents and Government Reports

Urban housing policies, sustainability guidelines, and development frameworks at national and international levels are reviewed. These documents help assess how sustainable construction is integrated into affordable housing programs and how policy interventions support health improvement and poverty reduction among the urban poor.

3.3 Method of Data Analysis

The study employs **content analysis** as the primary analytical tool. Content analysis involves systematically reviewing and categorizing textual data to identify recurring themes and patterns. In this study, information from various sources is analysed under the following thematic categories:

- Health outcomes (physical and mental health)
- Indoor environmental quality (ventilation, lighting, sanitation)
- Comfort indicators (thermal, visual, and acoustic comfort)
- Lifestyle and daily living practices
- Socio-economic benefits related to sustainable housing

By comparing and synthesizing findings across multiple sources, the study identifies common trends and key impacts of sustainable construction on the well-being of the urban poor.

3.4 Scope and Limitations of the Methodology

The methodology provides a broad understanding of the subject based on existing literature and documented evidence. However, the study is limited by the absence of primary data such as field surveys or interviews. Despite this limitation, the use of authoritative secondary sources ensures reliability and relevance of findings. The results are intended to offer conceptual insights and policy-level understanding rather than location-specific conclusions.

3.5 Ethical Considerations

As the study relies exclusively on secondary data from published and publicly available sources, no direct ethical risks are involved. All data sources are appropriately acknowledged to maintain academic integrity and avoid plagiarism.

4. SUSTAINABLE CONSTRUCTION: CONCEPT AND PRINCIPLES

Sustainable construction refers to a holistic approach to building that aims to reduce negative environmental impacts while improving social well-being and economic efficiency throughout the entire life cycle of a building. This life cycle includes planning, design, construction, operation, maintenance, and eventual demolition or reuse. Unlike conventional construction practices, which often focus only on initial cost and speed, sustainable construction emphasizes long-term environmental responsibility, human health, and affordability.

For urban poor communities, sustainable construction is especially important because housing conditions directly affect health, comfort, safety, and economic stability. By adopting sustainable principles, housing can become healthier, more resilient, and more affordable without increasing financial burden on low-income households.

4.1 Use of Eco-Friendly and Locally Available Materials

One of the core principles of sustainable construction is the use of environmentally friendly and locally sourced building materials. Materials such as bamboo, compressed earth blocks, fly ash bricks, recycled aggregates, and natural fibres reduce the environmental footprint of construction. Locally available materials lower transportation costs and carbon emissions while supporting local economies.

For the urban poor, these materials are often more affordable and better suited to local climatic conditions. Additionally, eco-friendly materials reduce exposure to harmful chemicals, improving indoor air quality and reducing health risks such as respiratory and skin-related problems.

4.2 Energy-Efficient Design and Natural Lighting

Energy efficiency is a key element of sustainable construction. Buildings are designed to maximize natural daylight and reduce dependence on artificial lighting and mechanical cooling. Proper orientation of buildings, window placement, use of reflective surfaces, and shading devices help regulate indoor temperatures.

In low-income urban housing, energy-efficient design reduces electricity consumption and lowers household energy expenses. Access to natural light also improves visual comfort, supports mental well-being, and creates healthier living environments.

4.3 Adequate Ventilation and Thermal Comfort

Sustainable construction emphasizes natural ventilation and thermal comfort to maintain healthy indoor environments. Features such as cross-ventilation, open layouts, ventilated roofs, and insulated walls help regulate temperature and improve air circulation.

For urban poor households, improved ventilation reduces indoor air pollution from cooking smoke and overcrowding. Thermal comfort protects residents from extreme heat or cold, reducing health risks such as heat stress, dehydration, and respiratory illness, especially among children and elderly populations.

4.4 Water Conservation and Waste Management

Efficient use of water and proper waste management are essential principles of sustainable construction. Measures such as rainwater harvesting, low-flow fixtures, greywater reuse, and improved drainage systems help conserve water and ensure hygiene.

Effective waste management, including solid waste segregation and proper sewage disposal, reduces environmental pollution and the spread of disease. For low-income communities, reliable access to clean water and sanitation significantly improves daily hygiene practices and overall public health.

4.5 Affordability and Long-Term Cost Efficiency

Affordability is a critical aspect of sustainable construction, particularly for the urban poor. While initial construction costs may sometimes be higher, sustainable buildings offer long-term economic benefits through reduced energy and water bills, lower maintenance costs, and increased durability.

Cost-efficient design and use of local materials make sustainable housing economically accessible. Over time, these savings help low-income families achieve greater financial stability and improve their quality of life.

4.6 Relevance of Sustainable Construction for Low-Income Urban Communities

For low-income urban populations, sustainable construction goes beyond environmental protection. It promotes social inclusion by providing safe, dignified, and healthy housing. Sustainable housing supports better health, improved comfort, and economic resilience, making it a powerful tool for inclusive urban development and poverty reduction.

5. IMPACT ON HEALTH OF THE URBAN POOR

Housing conditions play a crucial role in determining the health status of the urban poor. Inadequate housing often exposes residents to unhealthy indoor environments, poor sanitation, and extreme climatic conditions. Sustainable construction addresses these challenges by improving building design, material selection, and infrastructure, thereby contributing to better physical and mental health outcomes.

5.1 Physical Health Improvements

Poor-quality housing in urban low-income areas is closely associated with a wide range of physical health problems, including respiratory diseases, waterborne infections, heat stress, and vector-borne illnesses. Sustainable construction practices help reduce these health risks by creating safer and healthier living environments.

a) Improved Ventilation and Indoor Air Quality

In many conventional low-income houses, poor ventilation leads to the accumulation of smoke, dust, and indoor pollutants from cooking fuels and overcrowding. Sustainable construction promotes natural ventilation through features such as cross-ventilation, ventilated roofs, and adequately placed windows. Improved air circulation reduces indoor air pollution, lowering the risk of respiratory diseases such as asthma, bronchitis, and tuberculosis.

b) Use of Non-Toxic and Safe Building Materials

Conventional construction often uses low-quality materials that release harmful chemicals and dust, contributing to respiratory and skin-related disorders. Sustainable construction encourages the use of non-toxic, eco-friendly, and locally available materials such as fly ash bricks, stabilized earth blocks, bamboo, and natural finishes. These materials improve indoor air quality and reduce exposure to health hazards, especially for children and elderly residents.

c) Proper Drainage, Sanitation, and Hygiene

Lack of proper drainage and sanitation is a major cause of waterborne and vector-borne diseases in urban poor settlements. Sustainable housing includes improved sewage systems, proper waste disposal, and effective drainage to prevent water stagnation. These measures reduce the spread of diseases such as diarrhea, cholera, malaria, and dengue, thereby improving overall community health.

d) Thermal Insulation and Protection from Extreme Heat

Urban poor households often live in structures with tin roofs and poorly insulated walls, making them vulnerable to extreme heat or cold. Sustainable construction incorporates thermal insulation, reflective roofing materials, shading devices, and climate-responsive design. These features help maintain comfortable indoor temperatures and reduce heat stress, dehydration, and heat-related illnesses, particularly during summer months.

e) Reduction in Disease Incidence

Evidence from various studies indicates that residents living in sustainably designed low-income housing experience a lower incidence of asthma, tuberculosis, and gastrointestinal diseases compared to those living in conventional housing. Improved indoor environmental quality, sanitation, and thermal comfort collectively contribute to better physical health and reduced healthcare expenses for urban poor families.

5.2 Mental Health and Well-Being

Mental health and emotional well-being are strongly influenced by the quality of the living environment. For the urban poor, inadequate housing conditions such as overcrowding, poor lighting, excessive noise, and structurally unsafe dwellings contribute significantly to psychological stress, anxiety, and emotional fatigue. Daily exposure to these conditions affects not only individual mental health but also family relationships and community harmony.

Sustainable housing plays an important role in improving mental health by creating safer, healthier, and more dignified living spaces that support emotional stability and social well-being.

a) Adequate Daylight and Access to Open Spaces

Poor lighting in conventional housing often results in dark and congested interiors, which can cause feelings of depression and discomfort. Sustainable construction prioritizes access to natural daylight through proper building orientation, window placement, and open layouts. Exposure to natural light helps regulate sleep patterns, improves mood, and reduces mental fatigue.

Incorporation of open spaces, courtyards, and green areas provides residents with opportunities for relaxation and social interaction. These spaces promote emotional well-being and help reduce stress, especially among women, children, and elderly residents.

b) Enhanced Privacy and Sense of Safety

Overcrowded housing conditions often compromise privacy, leading to psychological stress and family conflicts. Sustainable housing design includes better spatial planning, defined living areas, and safer structural layouts. Improved privacy allows individuals and families to carry out daily activities with dignity and comfort.

Structural safety and secure housing materials reduce fear related to building collapse, fire hazards, and environmental risks. A secure living environment provides peace of mind, which is essential for mental stability and emotional health.

c) Reduction of Noise Pollution and Overcrowding

Noise from traffic, neighbours, and informal commercial activities is common in dense urban settlements. Sustainable construction uses improved layout planning, sound-insulating materials, and zoning strategies to reduce noise levels within homes. Quieter indoor environments help improve concentration, sleep quality, and emotional balance.

Reduced overcrowding through better space utilization and housing design lowers stress levels and enhances interpersonal relationships. It also creates a more organized and comfortable home environment.

d) Creation of Dignified and Supportive Living Environments

Sustainable housing promotes dignity by providing clean, well-designed, and functional living spaces. A well-maintained home increases self-respect and confidence among residents. Feeling valued and respected through improved housing conditions positively affects mental health and social behaviour.

Community-based sustainable housing projects encourage social interaction, cooperation, and collective responsibility. This fosters a sense of belonging and strengthens social ties within the community, which is essential for emotional support and resilience.

e) Overall Impact on Mental Well-Being

By addressing factors such as lighting, space, safety, and environmental quality, sustainable housing significantly reduces stress, anxiety, and emotional distress among the urban poor. These improvements foster a sense of security, self-worth, and community belonging, contributing to better mental health and overall quality of life.

6. IMPACT ON COMFORT AND LIVING CONDITIONS

Comfort is a key component of quality of life and is directly influenced by housing design and construction practices. For the urban poor, inadequate housing often results in uncomfortable indoor environments characterized by excessive heat, poor ventilation, insufficient lighting, and congested spaces. Sustainable construction addresses these issues by improving thermal, acoustic, visual, and spatial comfort, thereby enhancing daily living conditions and overall well-being.

6.1 Thermal and Acoustic Comfort

Thermal comfort refers to the ability of a building to maintain indoor temperatures that are comfortable for occupants without excessive dependence on mechanical cooling or heating systems. Sustainable construction employs **passive design strategies** such as proper building orientation, roof insulation, shading devices, reflective roofing materials, and natural ventilation to regulate indoor temperatures.

In tropical and densely populated urban areas, the urban poor are particularly vulnerable to extreme heat due to poorly insulated roofs, limited airflow, and high-density surroundings. Sustainable housing helps reduce indoor heat gain, preventing discomfort, dehydration, and heat-related illnesses. Improved thermal comfort also enhances sleep quality and daily productivity.

Acoustic comfort is equally important, especially in crowded urban environments where noise pollution from traffic, commercial activities, and neighbouring households is common. Sustainable construction incorporates better layout planning, buffer spaces, and sound-absorbing materials to reduce noise transmission. Reduced

noise levels improve concentration, reduce stress, and support mental well-being, particularly for children, elderly individuals, and those working from home.

6.2 Visual and Spatial Comfort

Visual comfort is achieved through adequate access to natural daylight and appropriate artificial lighting. Sustainable housing design emphasizes larger windows, proper building orientation, and open layouts that allow daylight to penetrate interior spaces. Natural light improves visibility, reduces eye strain, and positively influences mood and mental health.

Spatial comfort relates to the efficient use and organization of indoor spaces. Sustainable construction promotes well-planned room layouts that reduce overcrowding and allow for flexible use of space for sleeping, cooking, studying, and social activities. Better spatial organization enhances privacy and functional efficiency in daily life.

In addition, the inclusion of **green spaces, courtyards, and semi-open areas** in sustainable housing developments provides opportunities for physical relaxation and social interaction. These shared spaces encourage community bonding, physical activity, and emotional well-being. For the urban poor, access to such spaces is particularly valuable as it improves living conditions beyond the interior of the home.

Overall Impact on Comfort

By improving thermal, acoustic, visual, and spatial comfort, sustainable construction creates healthier and more liveable environments for low-income urban communities. Enhanced comfort reduces physical strain, supports mental health, and allows residents to carry out daily activities more effectively and with dignity.

7. IMPACT ON DAILY LIFESTYLE AND ECONOMIC STABILITY

Sustainable construction not only improves health and comfort but also has a significant impact on the **daily lifestyle and economic stability** of the urban poor. Improved housing conditions reduce living costs, enhance productivity, and strengthen social relationships, thereby contributing to long-term poverty reduction and social well-being.

7.1 Reduced Household Expenditure

One of the most immediate benefits of sustainable housing is the reduction in household expenditure. Energy-efficient design, improved insulation, natural lighting, water-saving fixtures, and rainwater harvesting systems significantly lower electricity and water consumption.

For low-income households, savings from reduced utility bills play a crucial role in improving economic stability. The money saved can be redirected toward essential needs such as nutritious food, children's education, healthcare, and savings for emergencies. Reduced medical expenses due to improved health conditions further enhance financial security.

Figure 1 illustrates a comparative representation of average monthly household expenditure in conventional housing versus sustainable housing, showing noticeable reductions in electricity, water, and healthcare-related costs.

7.2 Improved Productivity and Education

Healthier indoor environments created through sustainable construction have a direct impact on productivity and educational outcomes. Adequate ventilation, thermal comfort, reduced noise, and proper lighting improve sleep quality and reduce physical fatigue.

For adults, improved living conditions enhance concentration, energy levels, and work efficiency, especially for those engaged in home-based occupations. Reduced illness also means fewer workdays lost, contributing to stable income generation.

Children living in sustainable housing benefit from better study environments with sufficient lighting, quieter spaces, and improved air quality. These factors support better academic performance, increased school attendance, and overall cognitive development.

7.3 Social Inclusion and Community Development

Sustainable housing projects often adopt a participatory approach that involves community members in planning, construction, and maintenance. This participation promotes skill development in eco-friendly construction techniques and creates local employment opportunities.

Community-driven housing initiatives strengthen social networks and encourage cooperation among residents. Shared spaces such as courtyards, community halls, and green areas promote interaction and collective activities. This fosters a sense of belonging, mutual support, and social inclusion.

Moreover, involvement in maintaining sustainable infrastructure encourages environmental awareness and collective responsibility, leading to long-term sustainability of housing projects and improved community resilience.

Explanation of the Chart (For Use in Paper)

Figure 1: Comparison of Monthly Household Expenditure in Conventional and Sustainable Housing

The chart presents a comparative analysis of average monthly expenses incurred by urban poor households living in conventional housing and sustainable housing. It highlights reductions in electricity, water, and healthcare costs in sustainable housing. The observed decrease in expenditure demonstrates the economic advantages of sustainable construction and its role in improving financial stability and quality of life among low-income urban households.

Comparison of Average Monthly Household Expenditure in Conventional and Sustainable Housing

Expense Category	Conventional Housing (INR/month)	Sustainable Housing (INR/month)	Reduction (%)
Electricity	1200	700	~42%
Water	600	350	~42%
Healthcare	900	500	~44%
Total	2700	1550	~43%

Explanation of Table

Table 1 presents a comparative overview of average monthly household expenditure incurred by urban poor households living in conventional housing and sustainable housing. The data indicates a significant reduction in electricity and water expenses due to energy-efficient design, natural lighting, improved ventilation, and water conservation measures adopted in sustainable construction.

Additionally, healthcare expenditure is lower in sustainable housing as improved indoor environmental quality and sanitation reduce the incidence of illness. Overall, the reduction in total monthly expenditure highlights the economic benefits of sustainable construction and its contribution to improving financial stability and quality of life among low-income urban households.

8. CONTRIBUTION TO SUSTAINABLE DEVELOPMENT GOALS (SDGS)

Sustainable construction plays a significant role in achieving the United Nations Sustainable Development Goals (SDGs) by integrating environmental protection, social inclusion, and economic development. In the context of urban poor communities, sustainable housing addresses multiple development challenges simultaneously, including inadequate shelter, poor health, environmental degradation, and economic vulnerability. As a result, sustainable construction functions as a **multi-dimensional development tool** that supports inclusive and resilient urban growth.

8.1 Contribution to SDG 3: Good Health and Well-Being

SDG 3 aims to ensure healthy lives and promote well-being for all. Sustainable construction contributes to this goal by creating healthier living environments through improved housing quality. Features such as adequate ventilation, natural lighting, safe construction materials, and improved sanitation reduce exposure to indoor air pollution, communicable diseases, and environmental health risks.

For the urban poor, sustainable housing lowers the incidence of respiratory illnesses, waterborne diseases, heat stress, and mental health problems. Improved living conditions reduce healthcare expenditure and enhance overall well-being, thereby directly supporting the objectives of SDG 3.

8.2 Contribution to SDG 11: Sustainable Cities and Communities

SDG 11 focuses on making cities inclusive, safe, resilient, and sustainable. Sustainable construction promotes inclusive urban development by providing affordable, safe, and dignified housing for low-income populations. By incorporating climate-responsive design, efficient land use, and community-oriented planning, sustainable housing improves living conditions in high-density urban areas.

Sustainable housing projects also enhance urban resilience by reducing vulnerability to climate-related risks such as heatwaves, flooding, and extreme weather events. Community participation in sustainable housing initiatives strengthens social cohesion and promotes long-term maintenance and ownership, contributing to safer and more resilient urban communities.

8.3 Contribution to SDG 13: Climate Action

SDG 13 emphasizes urgent action to combat climate change and its impacts. Sustainable construction contributes to climate action by reducing greenhouse gas emissions through energy-efficient building design, use of low-carbon and recycled materials, and reduced reliance on fossil fuels.

Climate-resilient construction practices such as improved insulation, rainwater harvesting, and flood-resistant design help urban poor communities adapt to climate variability. By lowering energy consumption and

enhancing resilience, sustainable housing supports both climate mitigation and adaptation strategies under SDG 13.

8.4 Interlinkages with Other SDGs

In addition to SDGs 3, 11, and 13, sustainable construction indirectly contributes to other goals:

- **SDG 1 (No Poverty):** Reduced household expenditure and improved economic stability
- **SDG 6 (Clean Water and Sanitation):** Efficient water management and improved sanitation
- **SDG 8 (Decent Work and Economic Growth):** Green jobs and skill development in sustainable construction
- **SDG 10 (Reduced Inequalities):** Inclusive access to safe and affordable housing

8.5 Sustainable Construction as a Multi-Dimensional Development Tool

By addressing housing quality, public health, environmental sustainability, and economic inclusion simultaneously, sustainable construction serves as a powerful multi-dimensional development strategy. For the urban poor, it not only improves living conditions but also enhances resilience, dignity, and long-term socio-economic opportunities.

Integrating sustainable construction into urban housing policies and development programs is therefore essential for achieving the SDGs and promoting equitable and sustainable urban development.

Contribution of Sustainable Construction to SDGs

SDG	Goal	Sustainable Housing Outcome / Impact
SDG 1	No Poverty	Reduced household expenditure through energy and water efficiency, improving financial stability for low-income families
SDG 3	Good Health and Well-Being	Healthier indoor environments with proper ventilation, safe materials, sanitation, and thermal comfort reduce disease incidence and improve physical and mental health
SDG 6	Clean Water and Sanitation	Efficient water management, rainwater harvesting, and improved drainage ensure safe water supply and hygiene
SDG 8	Decent Work and Economic Growth	Skill development, local employment, and green jobs created through sustainable construction projects
SDG 10	Reduced Inequalities	Inclusive housing policies provide safe, affordable, and dignified homes for marginalized urban populations
SDG 11	Sustainable Cities and Communities	Climate-resilient, safe, and accessible housing improves living conditions and strengthens urban community resilience
SDG 13	Climate Action	Reduced carbon emissions through energy-efficient design, low-carbon materials, and climate-adaptive building practices

Explanation:

This table highlights how sustainable construction interventions directly and indirectly contribute to multiple Sustainable Development Goals. By improving health, comfort, financial stability, and social inclusion while reducing environmental impact, sustainable housing serves as an integrated approach to achieving urban sustainability and poverty alleviation.

9. CHALLENGES AND LIMITATIONS OF SUSTAINABLE CONSTRUCTION

While sustainable construction offers significant benefits in terms of health, comfort, economic stability, and environmental sustainability, its widespread adoption, particularly for low-income urban communities, faces several challenges and limitations. These challenges can be broadly categorized into financial, technical, regulatory, and social barriers.

9.1 Higher Initial Construction Costs

One of the primary barriers to sustainable construction is the **higher upfront cost** associated with eco-friendly materials, energy-efficient technologies, and climate-responsive design. Materials such as insulated walls, energy-efficient windows, low-emission paints, and rainwater harvesting systems often require greater initial investment compared to conventional construction methods.

For low-income households and affordable housing developers, this higher initial cost can limit adoption. Although sustainable buildings reduce long-term operational costs through lower energy and water bills, the **financial burden at the construction stage** often discourages implementation without policy incentives, subsidies, or affordable financing options.

9.2 Limited Awareness Among Policymakers and Beneficiaries

Many policymakers, urban planners, and beneficiaries lack awareness or understanding of the **long-term benefits of sustainable construction**. For example, residents may prioritize immediate affordability over durability, energy efficiency, or health benefits, while policymakers may focus on short-term housing delivery targets without integrating sustainability criteria.

This lack of awareness can result in **inadequate prioritization of sustainable housing practices**, limiting their scalability and effectiveness in improving urban living conditions for the poor.

9.3 Inadequate Technical Skills and Financing Mechanisms

Sustainable construction requires specialized skills in eco-friendly material selection, passive design, energy-efficient systems, and climate-adaptive techniques. In many developing countries, including India, **technical expertise is limited**, particularly among small-scale contractors and informal builders who often construct low-income housing.

Additionally, financing mechanisms for sustainable construction are underdeveloped. Traditional loans and subsidies may not account for **long-term cost savings**, making it difficult for developers and households to justify higher initial investments. Innovative financial instruments, green loans, or microfinance options are often lacking, which limits the adoption of sustainable housing solutions.

9.4 Regulatory and Land Tenure Issues

Regulatory and administrative challenges also hinder sustainable construction. Complex **building codes, zoning regulations, and permit procedures** can discourage the use of innovative sustainable technologies or materials. In informal settlements or slums, **unclear land tenure or lack of legal ownership** prevents residents from investing in durable, long-term housing improvements.

Furthermore, enforcement of environmental regulations and sustainability standards is often weak, resulting in partial or inconsistent implementation of sustainable practices.

9.5 Addressing the Challenges

Overcoming these barriers requires a **multi-pronged approach**:

1. **Policy Support:** Governments should offer financial incentives, tax rebates, subsidies, and inclusion of sustainability criteria in housing programs such as PMAY (Pradhan Mantri Awas Yojana) in India.
2. **Capacity Building:** Training programs for builders, contractors, and beneficiaries to develop skills in sustainable construction practices.
3. **Financing Mechanisms:** Introduction of green loans, microfinance, or long-term financing plans that account for operational savings.
4. **Regulatory Reforms:** Simplifying building codes, promoting flexible standards for low-cost sustainable housing, and ensuring legal clarity in land tenure.
5. **Awareness Campaigns:** Promoting the health, economic, and environmental benefits of sustainable housing among communities and policymakers to encourage adoption.

By addressing these limitations through **integrated policy support and public-private partnerships**, sustainable construction can be scaled effectively to benefit low-income urban populations while contributing to broader social, environmental, and economic goals.

10. CONCLUSION

Sustainable construction has emerged as a powerful tool for improving the **health, comfort, and daily lifestyle of the urban poor**. This study highlights that low-income urban households living in sustainably constructed homes experience significant improvements in both **physical and mental health**, including reduced respiratory illnesses, better sanitation, and lower stress levels.

In addition to health benefits, sustainable housing enhances **comfort** through improved thermal regulation, natural lighting, noise reduction, and optimized spatial layouts. These improvements positively influence daily routines, productivity, sleep quality, study conditions for children, and overall quality of life.

Economically, sustainable construction reduces household expenditure on energy, water, and healthcare, thereby providing financial relief to low-income families. The integration of community participation and skill development in sustainable housing projects strengthens social cohesion and promotes resilience, both at the household and community levels.

By combining **environmental sustainability, social inclusion, and economic efficiency**, sustainable construction aligns closely with the **Sustainable Development Goals (SDGs)**, particularly SDG 3 (Health), SDG 11 (Sustainable Cities), SDG 13 (Climate Action), and SDG 1 (No Poverty).

The study concludes that to achieve **inclusive urban development and social equity**, sustainable construction should not be treated as an optional or experimental approach. Instead, it must be **mainstreamed into urban housing policies, programs, and planning strategies** as a core mechanism for improving the quality of life for marginalized populations and creating resilient, sustainable urban communities.

11. RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed to enhance the adoption and effectiveness of sustainable construction for urban low-income communities:

11.1 Integrate Sustainable Construction Standards into Housing Policies

- Incorporate mandatory sustainability criteria in affordable housing programs, such as energy efficiency, ventilation standards, and use of eco-friendly materials.
- Ensure that policy frameworks consider long-term cost savings, health benefits, and climate resilience when evaluating housing projects.

11.2 Promote Low-Cost Green Materials and Local Technologies

- Encourage the use of locally sourced, non-toxic, and renewable construction materials such as bamboo, fly ash bricks, compressed earth blocks, and recycled aggregates.
- Support research and innovation to develop affordable green construction technologies suitable for low-income housing.

11.3 Encourage Community Participation in Housing Design and Maintenance

- Involve beneficiaries in the planning, design, and maintenance of sustainable housing projects to increase ownership, satisfaction, and long-term sustainability.
- Facilitate skill development and training programs for local workers in green construction techniques, creating employment opportunities and building local capacity.

11.4 Provide Financial Incentives and Subsidies for Sustainable Housing Projects

- Introduce green financing schemes, low-interest loans, and subsidies to offset higher initial construction costs and make sustainable housing accessible for low-income households.
- Encourage public-private partnerships to fund and scale sustainable housing initiatives, leveraging government support and private investment for maximum impact.

11.5 Raise Awareness and Build Capacity

- Conduct awareness campaigns to educate policymakers, urban planners, developers, and residents about the social, economic, and environmental benefits of sustainable housing.
- Strengthen technical capacity of builders, contractors, and local authorities to ensure effective implementation and maintenance of sustainable construction standards.

Overall Implication

Adopting these recommendations can **transform urban housing for the poor**, making it healthier, more comfortable, and economically sustainable, while contributing to climate resilience, social equity, and the achievement of SDGs. By integrating sustainable construction into mainstream housing policy, urban planners and governments can create **inclusive, resilient, and future-ready cities**.

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