



ARCHITECTURE AND HEALTH

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Abstract: Most of today's architectural practices are designed to meet the shelter needs of people. However, basic health needs for humans take priority over housing needs. Therefore, architectural applications should be designed in a way that healthier environments can be created for people. In this study, it is tried to examine the relevant literature on what qualities the living spaces should be designed in order to assure people to lead a healthier and more efficient life and to suggest for making existing buildings healthier. In line with this purpose, the factors affecting human health in architectural structures were primarily examined. Later, current architectural designs and health practices in today's architecture are emphasized. In the conclusion part of the study, in order to have a healthier life, the issues that should be considered while designing architectural designs were suggested and some suggestions were made to make existing buildings healthier.

Keywords: Architecture and health applications, Healthy life, Design

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1. Introduction

The qualities of the spaces that have begun to be built with the need for shelter and protection of people have changed as time passes and technology progresses. Changing living conditions, psychological and cultural factors pushed people to make changes in the places they live in. Therefore, there have been changes in people's concept of space in every period. These changes have also reflected on the characteristics of the buildings people live in over time.

The basic characteristics of a building are to determine the architectural project of that building. In all other projects, the architectural project is taken as basis. Considering the negative effects of the rapid increase of environmental problems on human health today, it is revealed that architectural projects should be prepared not only for the need for shelter and protection, but also for a healthy life. For this reason, architectural projects should be designed and implemented taking into account the health needs of people.

2. Factors Affecting Human Health in Architectural Structures

Human health is directly affected by the social and physicochemical environment, either positively or negatively. Individuals who make up the environment in which people live and the society they live in are defined as social environments. Climatic conditions, amount of sunbathing and air quality make up the physicochemical environment (CNA, 2009). Any negativity to be experienced in any of the environmental

factors also adversely affects human health.

People spend most of their time indoors. Buildings are very important but often overlooked determinants of health in terms of human health. Factors such as lack of ventilation and lighting, chemical pollutants, insufficient heating, high or low humidity for buildings affect human health.

Recently, scientific evidence on the relationship between architectural structures and human health has increased significantly. According to this scientific evidence, chemical pollutants and damp, mold and construction material-originated pollutants arising from errors in the designs of new buildings and existing buildings' systems have a negative impact on human health. In a report prepared by the World Health Organization (WHO) European Region Office in 2011, it was stated that 100,000 premature deaths occur annually in Europe as a result of diseases caused by inadequate housing (Braubach et al., 2011).

There are many factors affecting human health in architectural structures. These factors are explained under the following headings.

2.1. Air Pollution, Moisture and Mold

According to the results of the research, many respiratory system disorders seen in humans are caused by indoor air pollution. There is a constant relationship between the damp and moldy interiors, respiratory diseases and asthma. Indoor dampness, mold and air pollution increase the likelihood of asthma by 40% (Healthy Homes Barometer, 2017).

Due to the poor quality of indoor air, breathing



difficulties in children and respiratory system disorders such as asthma and bronchitis have increased twice in recent years (Barnes et al., 2016). For children living in damp and moldy houses, this rate is about 3 times (Peat et al., 1998).

The air quality of indoor environments also affects the productivity of people. Indoor environments with insufficient air quality can reduce the productivity of people by 6-9% (Wyon, 2004). For European Union countries, insufficient indoor air quality causes 2 million life years loss annually (Jantunen et al., 2011). In a study, it was observed that the number of students who passed the mathematics and grammar exam increased by 3% as a result of the improvements made to improve air quality in schools (Hansen et al., 2016).

2.2. Indoor Temperature

The temperature of the indoor environment of the buildings has a direct effect on human health. When the heat quality of indoor environments is improved, people's blood pressure normalizes, drug use and hospitalization rates decrease (Lloyd et al., 2008). One of the reasons for the higher mortality rates in the winter months compared to the summer months is the inadequate housing conditions. Premature death rates increase by 40% during the winter months due to unheated buildings (WHO, 2007).

The cold indoor environment of the buildings increases the rate of respiratory disease, especially in the elderly. Cold buildings also negatively affect people's mental health, causing health concerns and stress (Liddell, 2014).

Even if the indoor environments of the buildings are not at the appropriate temperature, it does not cause serious diseases, but it decreases efficiency. Especially for workplaces; it causes employee dissatisfaction, increase in personnel turnover rate and disease-related job losses (Office of the Surgeon General, 2005).

2.3. Daylight and Lighting

After the light enters the body through the eyes, it produces many physiological and psychological consequences. In accordance with the findings obtained from studies conducted to determine the effects of light on human health, it has been shown that sufficient amount of light is preventive, especially for depression and skin diseases, and it has been proven that light has an anti-depressive effect. Sunlight, which is proven to be important for body and mental health of sunlight at a certain intensity within a certain period of time; it can be used for the treatment of diseases such as slow growth, rheumatism, anemia, and anorexia.

Indoor spaces with sufficient light make people healthier and happier as well as increase productivity. Production capacity and productivity increase by 8-27% in sufficiently lit working environments. Inadequately illuminated environments, on the other hand, may cause temporary or permanent blindness by wearing down the eye nerves as well as distraction and morale in people (Sabuncuoğlu and Tüz, 1996).

2.4. Construction Materials

In the present time, technology is developing at a dizzying speed. This situation causes many chemical substances to enter human life. These chemicals make the relationship between health and environment more complex (Bahar and Gördes Aydoğdu, 2015).

According to researches, the gases and vapors emitted by building materials and the solvents and compounds they contain can cause many diseases ranging from burning eyes, mucous diseases, respiratory diseases and allergic reactions to cancer. One of the most dangerous ingredients found in building materials is asbestos, which increases the risk of lung cancer. The use of asbestos is banned in many countries. According to some findings, radon gas emitted from construction materials also increases the risk of lung cancer.

Construction materials; It can affect human health during the production phase, application phase and usage phase. In addition, the hardness, color, brightness, touch temperature, permeability and shape of the materials also create a psychological effect on humans (Balanlı and Küçükcan, 1998). The negative effect of this effect causes people to be negatively affected biologically (Yıldız and Şenkal, 2014).

2.5. Green Areas and Physical Activity Areas

Man is a part of nature and a being that needs to live in nature. For this reason, people want their living spaces to be a part of nature.

Green spaces and empty spaces to be created in architectural designs are essential for the creation of livable communities and the development of society. These areas also positively affect the climate balance and air quality in the region. This situation not only increases the quality of life of people but also affects their health positively (Yılmaz, 2007).

Physical activity areas or green areas found in architectural applications enable people to exercise regularly. Studies have shown that individuals who exercise regularly have less risk of chronic diseases, obesity and paralysis. Exercise has a positive effect on the level of sugar in the blood and reduces the amount of body fat. It is also an important factor in protecting heart health as it positively affects blood pressure. Exercising not only protects people from diseases but also improves people's quality of life (Karacabey and Özmerimanlı, 2011).

People who exercise feel better both psychologically and sociologically. Exercising gives people happiness and gives a sense of confidence as it positively contributes to physical appearance (Kuşgöz, 2005).

Since it is very important to exercise regularly for a healthy life, even walking people at least daily will contribute to their health positively.

3. Healthcare Practices in Today's Architecture

Conditions that make people's activities more efficient

and sustain them are defined as people's needs. People have not only biological but also psychological and sociological needs in their lives. Building designs that cannot respond to requests and needs and cannot solve problems will harm people instead of benefit. Buildings should be designed to build healthy structures that can meet the basic needs of people, such as safety, shelter and health (Çağlar, 2020).

The negative factors that can be found inside and outside the buildings, and the negative effects that may arise from these factors, which may cause health problems, increase the importance of healthy buildings. (Balanlı and Öztürk, 2006).

What should be done for healthy building designs and to minimize environmental pollution should be determined. Considering these situations, alternative building and urban designs should be emphasized in terms of both environment and human health. There are some standards to be followed when designing buildings. The most basic standards to be followed in healthy building design are as follows (Çağlar, 2020):

- Natural building materials should be preferred in buildings.
- Facades should be designed to breathe.
- The humidity in the indoor environment should be controllable.
- Good thermal insulation should be made.
- It should be ensured that sunlight can be used as natural light.
- The natural electrical field of the air should not be disturbed.
- Designs that will not cause air pollution should be developed.
- Certain dimensions should be considered.
- Renewable energy sources should be given priority.
- Green areas and physical activity areas should be created.

Designs that will be made without complying with these standards will create unhealthy buildings. Unhealthy structures will cause unhealthy possibilities in humans. Considering today's architectural structures, it is seen that most of them do not comply with these standards.

In crowded city centers, the buildings are both very close to each other and multi-storey due to the population density and lack of space. In addition, most of the buildings in city centers are old buildings and they were designed in the light of old architectural information. Most of these old buildings do not meet the basic standards to be followed in healthy building design. Many of the recently built and ongoing buildings do not even comply with many health standards in order to reduce the cost and shorten the construction period.

Tunnel formwork demands are used especially in mass housing and large-scale construction projects. Since the facades of the buildings constructed with the tunnel formwork system are made of non-breathing concrete,

the indoor air quality of these buildings is generally low. Designing today's architectural projects according to the features stated under the following headings will provide healthier buildings to people, as well as economic and ecological benefits to both individuals and society.

3.1. Clean Air Circulation

According to the results of many studies conducted in the related field, people spend approximately 70% of their time indoors. If workplaces are added to these closed environments, the rate rises to 90% (Spangler and Sexton, 1983).

Since the quality of the air decreases very quickly in closed environments, the air inside must be constantly refreshed (Güler, 2002). A person needs an average of 100 cubic meters of air per hour. In this case, indoor air should be refreshed frequently for a healthy life (Last and Wallace, 1992). The most efficient and healthiest way to achieve this is to provide natural air movement.

The movement of air in a closed environment is expressed as air movement. Air movement is possible by creating openings on both sides. When planning air movements in architectural designs, the direction of the wind and sun, the location of the building, the purpose of the building, the height of the building and the distance between the other structures around it should be evaluated one by one. In addition, the facades should be designed to breathe and designs should be developed to keep the humidity in the building under control. The incoming air must reach every part of the building for fresh air circulation. In order to achieve this, divider walls should be avoided indoors. The buildings should have sufficient number of windows that can be opened horizontally in sufficient dimensions. Apart from these, balconies of sufficient number, width and feature are also effective in the formation of air movement. Stairways should be well positioned and wide enough. For vertical ventilation, sufficient size and number of ventilation spaces should be designed in buildings (Çağlar, 2020).

Since clean air is of great importance for human health, it is necessary to focus on natural ventilation in architectural designs. Separate design strategies for summer and winter seasons should be used for air circulation in buildings. It should be ensured that less air enters the indoor environment in winter, and more air in the summer for health and comfort (Zarandi, 2006).

3.2. Getting More from Sunlight

Solar energy, which is a renewable and sustainable energy source, is an indispensable element for a healthy life thanks to its lighting and heating feature, as well as being the main source of energy on earth (Şahmalı, 2011). Solar energy, which is used not only for lighting purposes but also for heating the space, providing hot water and generating electricity, should be considered as an important input when designing the building (Ulusoy, 2012).

While designing healthy architectural structures, it is aimed to provide natural lighting by making the highest efficiency from sunlight thanks to passive daylight tools.

This situation decreases the amount of energy usage by reducing the need for artificial lighting (Sohrabi, 2015).

The planning of windows in certain heights and dimensions in buildings, the heights of the buildings and the distances between the buildings play an important role in the amount of sunlight reaching the interior spaces. No matter what type of material is used in the places where the architectural design is made correctly, there is no problem in terms of natural lighting (Öztürk and Çiğdem, 2006).

Buildings designed in accordance with solar architecture in a way that will provide maximum benefit from solar energy are not only healthy, but also contribute to both the country and the family economy by saving energy. Solar architecture is both ecological and healthy for humans, since solar energy is natural and renewable and does not generate harmful waste (Zeren, 1959).

3.3. Reducing Chemical Use and Using Recycled Building Materials

In terms of human health, the use of harmful chemicals and unnatural materials should be avoided as much as possible. Concrete materials used in buildings should be prepared in accordance with the determined national standards. Wood wall material should be used instead of concrete walls, especially in buildings with low number of floors, as it will reduce the rate of chemicals in buildings. Wood wall material also increases the air quality of indoor environments thanks to its air permeability.

Doors and windows of the buildings should be used as natural wood materials as possible. Coating materials, insulation materials, basic skeleton materials, paint and construction chemicals should be produced in accordance with certain standards and building materials that do not comply with the standards should not be used in architectural designs. Severe sanctions should be imposed for not producing and using building materials that do not comply with the standards.

Building materials such as asphalt, concrete, plastic, wood, metal, glass and ceramics used in the construction industry are materials that can be used widely in recycling. Building materials that are increased after construction works or obtained as waste material as a result of demolition processes can be recycled and used as raw materials or reused (Aydın İpekçi et al., 2017).

The widespread use of building materials obtained as a result of recycling in the construction sector will provide positive contributions in terms of economic, ecological and human health, and will create high amounts of raw material resources in terms of demand and consumption (Gürer et al., 2004).

3.4. Green Areas and Increasing Physical Activity Areas

Green areas are environments that enable people to benefit from clean and healthy air. Green areas that should be found in architectural designs are planned with vegetal elements, parks, playgrounds and sports areas, picnic areas, etc. It consists of areas. Green areas provide

people with a clean and spacious environment, as well as safe playgrounds for children and sports and social activity areas for young people and adults (Çalışkan, 1990).

Green areas control the microclimate. In addition to increasing the amount of oxygen in the environment, it cleans the air of the environment by keeping the dirty materials in the air. It reduces the harmful effects of sunlight by creating a natural curtain. The natural curtain created by green areas also absorbs noise and offers people a healthy and comfortable environment. Urban green spaces in people's living environments provide an opportunity for people to meet their needs for sports, entertainment, rest and meeting with each other. Along with these possibilities, it has a relaxing effect on human psychology with its aesthetic appearance. Thanks to the green areas and social activity areas, people feel happier by increasing their self-confidence by socializing more. Even this happiness enables people to be both more productive and healthier (Gül and Küçük, 2001).

Architectural structures, green areas and social activity areas should be distributed in a balanced way in order to ensure that individuals and society are healthier and more productive. This balanced distribution and integrity should be prioritized in all project stages of architectural structures. Architectural projects that will ensure this integrity should be prepared according to certain criteria and green areas should be included in certain proportions in each project (Yücekaya and Kocatürk, 2017).

4. Conclusion and Recommendations

Health practices to be considered in architectural designs are of great importance in terms of human health. A healthy building means a healthy person, and a healthy person means a healthy society. For this reason, designing architectural structures taking into account human health will increase the comfort and success of both individuals and society.

Within the scope of this study, the following conclusions have been reached in the literature review on the issues that can minimize the adverse effects of architectural structures on human health and should be included in architectural designs.

- Basic health needs of people should be prioritized in architectural designs.
- Windows should be designed in certain dimensions in order to benefit from sunlight efficiently.
- Building heights and the distance between buildings should be planned so that maximum efficiency from the sun can be achieved.
- It should be planned to have a sufficient number, size and quality of horizontal windows and balconies in order to create fresh air movement in the buildings.
- Stairways, ventilation spaces and elevator shafts

should be in certain standards and dimensions.

- When necessary, wind chimneys should be added to the buildings.
- For fresh air circulation, the direction of the wind and the sun, the location of the building, the purpose of the building, the height of the building and the distance between it and other structures around it should be evaluated individually.
- Building facades should be designed to breathe and designs should be developed to keep the humidity in the building under control.
- Natural building materials should be preferred in buildings, chemicals should be used as little as possible.
- Recyclable materials should be chosen as building materials, and waste building materials should be recycled.
- In order to make individuals and society healthier and more productive, green areas and social activity areas should be included in certain proportions in architectural designs.
- When the existing buildings of today are evaluated on the basis of these results, it is seen that most of them will negatively affect human health. For this reason, the following recommendations have been developed in order to offer people healthier environments.
- Unhealthy buildings should be controlled within a certain plan and buildings that do not meet certain standards should be renewed. This situation can be costly in the beginning. However, in the long run, energy efficiency will lead to savings by reducing health expenditures and increasing work efficiency. Government incentives can be applied for these renovations if necessary.
- The air quality of the indoor environment can be improved in terms of human health by installing roof-top systems for public buildings such as hospitals, schools, universities, which have a high cost of renovation. When roof-top systems are applied with a heating system, it will also ensure that the temperature of the indoor environment can be adjusted and will cover the installation cost in a shorter time. For this reason, roof-top systems can also be included in new architectural designs.
- In order to increase the air quality of the indoor environment, in the architectural designs of low-rise buildings, breathable wooden materials instead of concrete on exterior facades, and roof-top systems for high-rise buildings can be used. Both of these applications can be made mandatory by adding them to the required protocols.

Author Contributions

All tasks have been made by the single author.

Conflict of Interest

The author declared that there is no conflict of interest.

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