

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review



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ABSTRACT: This review paper examines visual pollution, its causes, and impacts on human health and well-being, defined as unattractive and disruptive visual elements in the environment that degrade aesthetic quality. It explores sources such as billboards, litter, industrial structures, and poorly planned urban development. The paper discusses how rapid urbanization, industrialization, and excessive advertising exacerbate visual clutter, particularly in urban areas.

The impacts of visual pollution on health are significant, including increased stress, anxiety, and diminished quality of life. Vulnerable populations, such as lower-income communities, children, and the elderly, face heightened risks due to greater exposure. The review highlights disparities in exposure and health outcomes, emphasizing that the cumulative effects of visual pollution and socio-economic disadvantages intensify its negative impact.

The paper also evaluates strategies for mitigation, including urban planning measures like green spaces and zoning regulations, as well as regulatory approaches to manage outdoor advertising and waste. By addressing visual pollution through comprehensive planning and regulation, the paper aims to inform policies that enhance environmental aesthetics and improve public well-being.

KEYWORDS: Visual pollution; Health impacts; Public well-being; Mitigation strategies; urban planning; Green spaces

1. INTRODUCTION

1.1 Definition of Visual Pollution

Visual pollution refers to the unattractive and undesirable visual elements in a landscape that disrupt the aesthetic appeal of an area. Unlike other forms of pollution, visual pollution does not necessarily pose a direct threat to human health, but it can have significant psychological and social impacts (Sagvan et al., 2019). Visual pollution occurs when human activities alter the visual environment in ways that are intrusive or damaging to the natural or built surroundings (Nasar, 1994). It includes any unattractive, overwhelming, or discordant visual stimuli in the environment that reduce its visual quality, leading to a degraded perception of an area (Sima, 2010).

1.2 Components of Visual Pollution

1.2.1 Billboards

Billboards are one of the most common forms of visual pollution, particularly in urban areas. These large, visually intrusive advertisements often clutter cityscapes and natural environments, detracting from the aesthetic appeal of both (Zacharias, 2001). The proliferation of billboards, especially when poorly regulated, can overwhelm public spaces and natural vistas, leading to a fragmented and chaotic visual experience (Shanmugathas, 2018). Billboards can also contribute to the desensitization of the public to visual stimuli, making it harder for meaningful or necessary signage to stand out (Kavaratzis, 2005).

1.2.2 Power Lines

Power lines are another significant contributor to visual pollution, especially when they cut through otherwise scenic landscapes. The presence of overhead power lines can disrupt the natural beauty of rural areas and parks, creating a sense of industrial intrusion (Palmer, 2004). The visual impact of power lines is often a point of contention in environmental planning, as they are necessary for infrastructure but can significantly reduce the visual quality of the environment (Hull & Bishop, 1988). The negative

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

perception of power lines is amplified in areas where they are densely clustered or where high-voltage lines are prominent (Sumper et al., 2021).

1.2.3 Buildings

The design and placement of buildings can also contribute to visual pollution, particularly when they clash with the surrounding environment or are poorly maintained. Skyscrapers and large commercial buildings can dominate the skyline, casting shadows and blocking views of natural features like mountains or rivers (Nasar, 1992). The aesthetics of a building, including its color, shape, and size, play a crucial role in how it is perceived by the public and whether it is seen as a form of visual pollution (Purcell, Peron, & Berto, 2001). Moreover, buildings that are not in harmony with the local architectural style or are dilapidated can create a sense of visual disarray (Stamps, 2013).

1.2.4 Litter

Litter is a pervasive and noticeable form of visual pollution that affects both urban and natural environments. The presence of litter, such as plastic bags, bottles, and other waste, can severely diminish the visual appeal of an area and create a sense of neglect and disorder (Campbell, 2007). Litter not only detracts from the aesthetics but also signals environmental degradation and can lead to further pollution as it accumulates (Schultz et al., 2013). The perception of an area as dirty or poorly maintained due to litter can also influence public behavior, leading to a cycle of ongoing littering (Rathje & Murphy, 2001).

1.3 Growing Concerns Regarding Visual Pollution

1.3.1 Rapid Urbanization and Its Impact on Visual Pollution

Rapid urbanization has significantly contributed to the increase in visual pollution, particularly in developing countries where urban growth is often unplanned and uncontrolled. As cities expand, the demand for housing, infrastructure, and commercial spaces leads to the construction of buildings and facilities that may not always be aesthetically pleasing or well-integrated into the existing environment (Pacione, 2009). The lack of coordinated urban planning can result in haphazard development, with buildings, billboards, and other structures cluttering the urban landscape and reducing its visual appeal (Angel, 2012). This uncontrolled growth often prioritizes economic gains over environmental and aesthetic considerations, leading to a visually chaotic urban environment.

1.3.2 Industrialization and the Proliferation of Visual Pollution

Industrialization has further exacerbated visual pollution, especially in regions where industries are densely concentrated. The construction of factories, power plants, and other industrial facilities often results in large, visually intrusive structures that dominate the landscape (Lynch, 1960). Additionally, industrial activities frequently lead to the accumulation of waste, both solid and airborne, which can contribute to the degradation of the visual environment (Bordenave & Lung, 1996). The presence of industrial facilities in urban areas not only impacts the aesthetic quality of the environment but also affects the overall livability of cities, as residents are forced to contend with both visual and environmental pollution.

1.3.3 The Role of Advertising in Visual Pollution

The rapid growth of urban areas has also led to a significant increase in outdoor advertising, contributing to visual pollution. Billboards, neon signs, and other forms of outdoor advertisements have become ubiquitous in cities, often overwhelming public spaces and natural vistas (Azumah, 2021). The unregulated proliferation of these advertisements creates a cluttered visual environment that can detract from the aesthetic quality of urban areas and lead to a sense of visual chaos (Widyo Harsanto & Raras Satuti, 2023). Moreover, the emphasis on commercial messaging in public spaces often marginalizes other forms of visual communication, reducing the diversity of visual experiences available to urban residents.

1.3.4 Environmental and Psychological Impacts of Visual Pollution

The increasing visual pollution due to urbanization and industrialization has significant environmental and psychological impacts. Visually cluttered environments can lead to decreased quality of life, as they contribute to stress and anxiety among urban residents (Swanwick, 2009). The loss of natural landscapes and the dominance of industrial and commercial structures in the visual environment can also reduce people's connection to nature, leading to a sense of alienation and disconnection from the environment (Ulrich, 1984). Additionally, the presence of visual pollution in urban areas can diminish property values and reduce the attractiveness of cities as places to live and work.

1.3.5 Global Concerns and the Need for Regulatory Measures

The growing concerns regarding visual pollution are not confined to any one region but are a global issue that requires concerted efforts to address. Internationally, there is increasing recognition of the need for regulations and planning measures to manage visual pollution, particularly in rapidly urbanizing areas (Habitat, 2013). Effective urban planning, stricter regulations on outdoor advertising, and the incorporation of aesthetic considerations into industrial and infrastructure projects are essential to mitigating

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

the impacts of visual pollution (Berleant, 1997). The challenge lies in balancing economic development with the need to preserve the visual quality of urban and natural environments.

1.4 Understanding the Impact of Visual Pollution on Human Health and Well-Being

Visual pollution, characterized by the presence of unattractive and chaotic visual elements in the environment, has been shown to impact psychological well-being and mental health. Studies have found that exposure to visually cluttered environments can lead to increased levels of stress, anxiety, and depression (Swanwick, 2009). By examining existing literature, this review aims to understand how visual pollution contributes to mental health issues and the extent of its impact on different populations.

The aesthetic quality of the environment plays a crucial role in shaping individuals' experiences and satisfaction with their surroundings (Porteous, 2013). This review will assess how visual pollution, including the presence of billboards, industrial structures, and litter, affects people's perceptions of their environment and their overall sense of well-being. Understanding these impacts can help in developing strategies to enhance the visual quality of urban spaces and improve residents' quality of life.

Certain groups, such as those living in densely populated urban areas or low-income communities, may be more exposed to visually polluted environments and thus more susceptible to its negative impacts (Evans, 2003). This review will highlight disparities in exposure and the resulting health outcomes. This understanding can guide targeted interventions to mitigate the effects of visual pollution on vulnerable populations.

Urban planning and environmental policies play a significant role in managing visual pollution, yet the success of these strategies varies widely (Sancar, 2009). This review will examine existing approaches, such as zoning regulations, aesthetic guidelines, and public awareness campaigns, to determine their effectiveness in improving visual environments and mitigating the negative impacts on health and well-being. By identifying successful strategies, this review will provide insights for future policy development.

2. SOURCES OF VISUAL POLLUTION

2.1 Urban Development

2.1.1 High-Density Buildings

High-density buildings, especially in urban areas, significantly contribute to visual pollution. The proliferation of skyscrapers and other large structures often leads to a cluttered skyline, obstructing natural views and creating a sense of visual chaos. Studies have shown that the visual dominance of tall buildings can negatively affect residents' perception of their environment, leading to decreased satisfaction and increased stress levels (Punter, 2007). The lack of architectural coherence in high-density areas further exacerbates these effects, as a mix of styles and scales can create a jarring and aesthetically displeasing urban landscape.

2.1.2 Poorly Designed Infrastructure

Poorly designed infrastructure, including roads, bridges, and utility installations, is another major contributor to visual pollution. When infrastructure lacks consideration for aesthetic and environmental integration, it can dominate the visual field and disrupt the harmony of the surrounding environment. This is particularly evident in areas where infrastructure projects are executed without proper urban planning, resulting in visual clutter and a disjointed landscape (Nasar, 1990). The absence of green spaces or aesthetically pleasing elements in infrastructure design often leaves residents feeling disconnected from their environment, contributing to a decline in overall well-being.

2.1.3 Overcrowded Spaces

Overcrowded spaces, characterized by a high density of people, vehicles, and structures, also play a significant role in visual pollution. In densely populated urban areas, the sheer volume of signage, advertisements, and uncoordinated building designs can overwhelm the senses, leading to visual fatigue and reduced quality of life (Appleyard, 1979). The constant presence of crowds and congestion further detracts from the visual appeal of an area, making it difficult for residents and visitors to find respite from the visual noise. This over-saturation of visual stimuli in overcrowded spaces can contribute to mental health issues, including stress and anxiety.

2.1.4 Combined Effects and the Need for Integrated Urban Planning

The combined effects of high-density buildings, poorly designed infrastructure, and overcrowded spaces underscore the need for integrated urban planning strategies to mitigate visual pollution. By considering the aesthetic and functional aspects of urban development, cities can reduce visual clutter and create more harmonious environments. Research suggests that implementing green spaces, cohesive architectural guidelines, and infrastructure that blends with the natural environment can significantly enhance the visual quality of urban areas (Carmona, 2021). These strategies not only improve the visual appeal of cities but also contribute to the well-being and mental health of their inhabitants.

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

2.2 Advertising

2.2.1 Billboards

Billboards have long been identified as significant contributors to visual pollution, particularly in urban areas. The presence of large, often brightly lit advertisements along highways and in city centers disrupts the natural and built environments, leading to visual clutter. This visual clutter can diminish the aesthetic quality of an area, making it less appealing to both residents and visitors. Research indicates that the overabundance of billboards can create a sense of disorientation and reduce the overall visual coherence of urban landscapes, negatively impacting the perception of a city's character (Salwa, 2022). Furthermore, billboards can obscure natural views and architectural features, further contributing to the degradation of the visual environment.

2.2.2 Digital Screens

The rise of digital screens as advertising mediums has exacerbated issues of visual pollution. Unlike traditional billboards, digital screens are dynamic, displaying changing images and videos that attract attention and contribute to visual overload. These screens are often placed in highly visible locations, such as city squares and shopping districts, where they can dominate the visual field and distract from the surrounding environment. Studies have shown that the constant motion and brightness of digital advertisements can lead to visual fatigue and decreased mental well-being, particularly in areas where such screens are densely concentrated (Jana & De, 2015). Additionally, the light pollution generated by digital screens can interfere with circadian rhythms and contribute to broader environmental concerns.

2.2.3 The Ubiquity of Advertisements and Its Consequences

Advertisements, whether on billboards, digital screens, or other mediums, have become ubiquitous in modern urban environments. This omnipresence of advertising content contributes to a phenomenon known as "ad creep," where public spaces are increasingly dominated by commercial messages, leaving little room for non-commercial visual elements (Crawford, 1992). The saturation of public spaces with advertisements can lead to a sense of visual bombardment, where individuals feel overwhelmed by the constant exposure to marketing messages. This can result in negative psychological effects, including stress and a decreased sense of autonomy over one's environment. Moreover, the prioritization of advertising space over public art and natural features can diminish the cultural and social value of urban areas, reducing their appeal and livability.

2.2.4 The Role of Regulations in Managing Visual Pollution from Advertisements

The management of visual pollution from billboards, digital screens, and advertisements is increasingly becoming a concern for urban planners and policymakers. In response to the negative impacts of visual clutter, some cities have implemented regulations that limit the size, placement, and brightness of advertisements in public spaces (Kelling & Coles, 1997). These regulations aim to strike a balance between commercial interests and the need to preserve the visual quality of urban environments. However, enforcement of such regulations can be challenging, particularly in rapidly growing cities where commercial pressures are high. Research suggests that effective management of visual pollution requires a comprehensive approach that includes public input, careful urban planning, and ongoing monitoring of advertising practices.

2.2.5 Future Trends and Challenges in Addressing Visual Pollution from Advertising

As technology continues to advance, the potential for visual pollution from advertising is likely to increase. Emerging trends such as augmented reality advertisements and interactive digital displays pose new challenges for managing visual clutter in urban areas. These technologies have the potential to further blur the lines between public and commercial spaces, making it even more difficult to preserve the visual integrity of cities (Froe, 2023). Addressing these challenges will require innovative solutions, such as the development of guidelines for the ethical use of new advertising technologies and the promotion of alternative, less intrusive forms of public communication.

2.3 Industrial and Technological Sources

2.3.1 The Impact of Power Lines on Visual Pollution

Power lines are a common feature of urban and rural landscapes, but their visual impact is often controversial. These structures can dominate the skyline, creating visual clutter and disrupting the natural aesthetics of an area. The visual intrusion of power lines is particularly noticeable in scenic or historic areas, where they can detract from the overall visual experience. Research indicates that the presence of overhead power lines can lower property values and negatively impact the perception of a community's attractiveness (Bond & Hopkins, 2000). The negative visual impact of power lines has led to calls for their burial underground, especially in areas of high scenic or cultural value, although this solution is often cost-prohibitive.

2.3.2 Visual Pollution from Factories and Industrial Installations

Factories and industrial installations are significant contributors to visual pollution, especially in urban and suburban areas. The large, often utilitarian structures of factories can clash with surrounding environments, creating eyesores that diminish the

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

aesthetic quality of the landscape. This is particularly problematic in areas where industrial zones are located near residential neighborhoods or natural landscapes. Studies have shown that the visual presence of factories can lead to decreased quality of life for nearby residents, including reduced mental well-being and dissatisfaction with the local environment (Lackey et al., 2021). The visual impact of industrial facilities is compounded by the presence of smoke stacks, storage tanks, and other large structures, which further contribute to visual clutter and environmental degradation.

2.4 Litter and Waste

2.4.1 Improperly Disposed Waste and Visual Pollution

Improperly disposed waste, including litter and illegal dumping, is a significant contributor to visual pollution in urban and rural areas alike. The presence of waste in public spaces not only detracts from the aesthetic quality of the environment but also signals neglect and lack of care, which can lead to further degradation. Studies have shown that areas with high levels of visible waste tend to experience a decline in community pride and social cohesion, as residents feel less connected to and responsible for their surroundings (Cialdini et al., 1990). Additionally, improperly disposed waste can attract pests and create health hazards, further compounding the negative impact on both the environment and public well-being.

2.4.2 The Impact of Graffiti on Visual Pollution

Graffiti, especially when unauthorized or placed in inappropriate locations, is a prominent source of visual pollution. While some view graffiti as a form of artistic expression, in many contexts it is associated with vandalism and urban decay. The presence of graffiti can negatively affect the perceived safety and cleanliness of an area, leading to reduced property values and increased perceptions of crime (Fieni, 2016). Furthermore, the proliferation of graffiti in public spaces often prompts costly and continuous efforts by municipalities to remove or cover the markings, diverting resources from other community needs.

2.4.3 Derelict Spaces and Their Contribution to Visual Pollution

Derelict spaces, including abandoned buildings, vacant lots, and neglected public areas, contribute significantly to visual pollution. These spaces often become overgrown, littered, and graffiti-covered, creating an environment that can feel unsafe and unwelcoming. The presence of derelict spaces is often linked to broader issues of economic decline, social disinvestment, and urban blight (Song, 2020). Such areas not only detract from the visual appeal of a community but can also serve as focal points for illegal activities, further exacerbating their negative impact on the local environment and residents' quality of life.

3. HEALTH IMPACTS OF VISUAL POLLUTION

3.1 Mental Health and Psychological Well-being:

3.1.1 Visual Pollution and Stress

Research has shown that visual pollution, such as cluttered environments filled with billboards, graffiti, and litter, can significantly contribute to stress levels in individuals. Studies have demonstrated that exposure to visually chaotic and unappealing environments triggers physiological stress responses, including elevated cortisol levels and increased heart rate (Ulrich, 1984). This response is believed to be rooted in the human preference for visually harmonious and natural environments, where the brain can process information more effortlessly, leading to a state of relaxation. In contrast, environments polluted with visual stimuli require more cognitive effort to process, contributing to a heightened state of stress and discomfort.

3.1.2 Visual Pollution and Anxiety

Visual pollution is also linked to increased levels of anxiety. Environments that are visually overwhelming or cluttered can create a sense of chaos and lack of control, which are key factors in the development of anxiety disorders. A study by Forgays and Forgays (1992) found that individuals living in visually polluted areas reported higher levels of anxiety compared to those in visually appealing environments (Forgays, & Forgays, 1992). The constant exposure to negative visual stimuli can cause chronic worry and agitation, as individuals struggle to navigate and make sense of their surroundings, leading to heightened anxiety levels.

3.1.3 Visual Pollution and Depression

There is growing evidence linking visual pollution to the development of depressive symptoms. Environments that are visually polluted with abandoned buildings, excessive signage, and litter can create a pervasive sense of bleakness and hopelessness. Kaplan's (1995) suggests that natural and aesthetically pleasing environments can help restore mental fatigue and reduce symptoms of depression (Kaplan's, 1995). Conversely, environments lacking these qualities, which are often characterized by visual pollution, may exacerbate feelings of sadness, fatigue, and hopelessness, contributing to the onset or worsening of depression.

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

3.1.4 Visual Pollution and Reduced Quality of Life

Visual pollution has a profound impact on individuals' perceived quality of life. Environments marred by unsightly elements such as graffiti, billboards, and litter can lead to feelings of dissatisfaction and discomfort, reducing overall well-being. Research by Sullivan and Chang (2011) indicates that people living in areas with high levels of visual pollution report lower levels of life satisfaction and community pride. The continuous exposure to unattractive and disordered surroundings can diminish the sense of safety, belonging, and overall happiness, thereby reducing the perceived quality of life.

3.2 Visual Fatigue and Eye Strain:

3.2.1 Visual Fatigue and Bright, Flashy Visuals

Constant exposure to bright and flashy visuals, such as those from digital screens, billboards, and neon signs, has been linked to visual fatigue. Studies have shown that the human eye is not well-adapted to prolonged exposure to intense and rapidly changing light sources, which can lead to eye strain and discomfort. The high contrast and flickering nature of such visuals force the eye muscles to work harder to maintain focus and process the images, leading to symptoms like eye soreness, headaches, and blurred vision (Blehm et al., 2005). This condition, often referred to as "digital eye strain" or "computer vision syndrome," is increasingly common in urban environments where such visuals are prevalent.

3.2.2 Overcrowded Visuals and Eye Health

Environments filled with overcrowded visuals, such as dense signage, advertisements, and cluttered urban landscapes, can also negatively impact eye health. The overwhelming amount of visual information can cause the eyes to become fatigued as they struggle to constantly shift focus and filter out unnecessary details. According to Rosenfield (2011), this continuous demand on the visual system can lead to visual fatigue, characterized by symptoms such as dry eyes, difficulty concentrating, and a reduction in visual acuity (Rosenfield, 2011). The cumulative effect of these symptoms over time can contribute to more serious eye conditions, especially in individuals who are already predisposed to eye strain.

3.2.3 Impact of Prolonged Visual Stimuli on Eye Health

Prolonged exposure to visual stimuli, particularly in urban settings filled with bright, flashy, and overcrowded visuals, can lead to a decrease in overall eye health. The repetitive strain on the eyes from processing excessive visual information can result in chronic visual fatigue. Zheng et al. (2021) highlighted that such environments could exacerbate existing conditions like myopia and astigmatism, as the eye muscles are under continuous stress to adjust to varying light levels and focus on multiple objects at different distances (Zheng et al., 2021). The persistent demand on the visual system can also reduce its ability to recover, leading to long-term issues such as persistent eye strain and reduced visual function.

3.2.4 Blue Light Exposure from Bright Visuals

Bright visuals, especially those emitting blue light, like digital screens and LED billboards, have been shown to contribute to visual fatigue and other eye-related problems. Blue light has a shorter wavelength and higher energy, which scatters more easily and can cause the eye to work harder to maintain focus, leading to strain (Lin et al., 2017). Additionally, excessive blue light exposure, particularly at night, can disrupt circadian rhythms and contribute to digital eye strain. This not only causes immediate discomfort but may also increase the risk of developing long-term eye issues, including macular degeneration.

3.3 Reduced Cognitive Function:

3.3.1 Impact of Visual Clutter on Concentration

Visual clutter, which refers to an excessive number of visual stimuli in an environment, can significantly impact concentration. Research indicates that environments overloaded with visual information can lead to cognitive overload, making it difficult for individuals to focus on specific tasks. Studies by Carver et al. (2008) demonstrate that visual clutter can reduce cognitive efficiency by increasing the amount of irrelevant information that the brain needs to process, thus impairing the ability to concentrate (Carver et al., 2008). The presence of too many competing visual elements can distract attention and reduce task performance, leading to decreased productivity and increased cognitive fatigue.

3.3.2 Visual Clutter and Memory

Visual clutter has also been shown to affect memory retention and recall. The presence of excessive and competing visual stimuli can overwhelm the cognitive system, leading to difficulties in encoding and retrieving information. According to a study by Baddeley and Hitch (1974), the working memory system can become overloaded when faced with high levels of visual clutter, which impairs the ability to remember and process information effectively (Baddeley & Hitch, 1974). This cognitive overload can result in reduced memory performance and difficulty in recalling information when needed.

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

3.3.3 Visual Clutter and Productivity

The impact of visual clutter on productivity is well-documented in organizational and work environments. Environments characterized by excessive visual stimuli can reduce overall productivity by causing frequent distractions and impairing task performance. A study by Evans (2000) found that individuals working in cluttered environments experience reduced productivity due to the increased cognitive load required to filter out irrelevant visual information (Evans, 2000). This clutter-induced cognitive burden can lead to slower work performance, higher error rates, and increased stress, ultimately affecting overall job efficiency and satisfaction.

3.3.4 Visual Clutter and Cognitive Load

Visual clutter increases cognitive load, which can negatively impact various cognitive processes such as problem-solving and decision-making. Research by Sweller (1988) on cognitive load theory suggests that environments with high levels of visual clutter can overwhelm the cognitive system, making it harder to perform complex tasks that require mental effort (Sweller, 1988). The cognitive load imposed by visual clutter can reduce the efficiency of problem-solving and decision-making processes, leading to lower performance and increased mental fatigue.

3.4 Impact on Children's Development:

3.4.1 Impact of Visual Pollution on Children's Learning

Visual pollution, including excessive and distracting visual stimuli such as bright advertisements and poorly designed environments, can negatively affect children's learning. A study by Banire et al. (2020) found that environments with high visual clutter can lead to decreased attention and concentration in children, impacting their ability to engage with educational material (Banire et al., 2020). The presence of competing visual stimuli can distract students from their tasks and hinder their cognitive processing, thereby affecting academic performance and learning outcomes.

3.4.2 Visual Pollution and Developmental Milestones

Exposure to visual pollution can influence developmental milestones in children, particularly in relation to sensory and cognitive development. Research indicates that children exposed to environments with high levels of visual clutter may experience delays in visual and perceptual development. The study suggests that constant exposure to overwhelming visual stimuli can interfere with the development of visual processing skills, which are critical for various cognitive functions and developmental milestones (Gifford, 2014).

3.4.3 Behavioral Problems Linked to Visual Pollution

Children exposed to visual pollution, such as chaotic and cluttered environments, may exhibit behavioral problems. A study found that children in visually polluted environments are more likely to exhibit signs of stress and behavioral issues, including aggression and impulsivity. The research highlights that the constant bombardment of visual stimuli can lead to increased anxiety and frustration, which in turn affects behavior and emotional regulation in children (Evans & Wachs, 2010; Dul & Ceylan, 2011).

3.4.4 Visual Pollution and Attention Span

The presence of visual pollution can reduce children's attention span and focus. Research demonstrated that children exposed to environments with excessive visual stimuli had shorter attention spans and were more prone to distraction. The study emphasizes that visual clutter can overwhelm children's cognitive resources, leading to difficulties in maintaining attention and completing tasks effectively (Fisher & Kloos, 2016).

3.5 General Well-being:

3.5.1 Correlation Between Visual Pollution and General Well-Being

Several studies have highlighted the negative impact of visual pollution on general well-being. Research by Kaplan and Kaplan (1989) suggests that visually polluted environments, characterized by excessive and disorganized visual stimuli, can lead to reduced general well-being. Their study indicates that exposure to such environments can cause stress and discomfort, which negatively affects overall mental health and life satisfaction. The authors argue that a cluttered visual environment can lead to cognitive overload and emotional distress, thus reducing overall quality of life (Kaplan & Kaplan, 1989).

3.5.2 Visual Pollution and Life Satisfaction

The impact of visual pollution on life satisfaction has been examined in various studies. For instance, a study by Stokols and Shumaker (1981) found that individuals living in visually polluted environments reported lower levels of life satisfaction compared to those in less cluttered settings. The study emphasizes that the visual quality of one's environment can significantly influence personal satisfaction and perceived quality of life (Stokols, 1981). The presence of unsightly or overwhelming visual elements can detract from one's sense of comfort and contentment.

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

3.5.3 Visual Pollution and Emotional Well-Being

Visual pollution has been linked to adverse effects on emotional well-being. Research by Ulrich et al. (1991) indicates that environments with high levels of visual clutter can lead to increased feelings of stress and anxiety, which in turn affect emotional health. Their study shows that individuals exposed to visually cluttered environments experience more negative emotions and reduced emotional well-being compared to those in visually calming settings. This research highlights the importance of visual aesthetics in maintaining emotional balance and well-being (Ulrich et al., 1991).

3.5.4 Long-Term Impact of Visual Pollution on Quality of Life

Long-term exposure to visually polluted environments can have a profound impact on quality of life. A study by Berto (2005) examined how persistent exposure to visually cluttered or unpleasant environments can lead to long-term reductions in overall life satisfaction and well-being. The research found that individuals living in such environments are more likely to experience chronic stress and diminished quality of life. The study underscores the importance of considering visual quality in urban planning and environmental design to enhance overall life satisfaction.

4. VISUAL POLLUTION IN DIFFERENT CONTEXTS

4.1 Urban vs. Rural Environments:

4.1.1 Impact of Visual Pollution in Urban Settings

Urban environments are often characterized by high levels of visual pollution due to dense development, extensive signage, and high traffic volumes. Research by Cackowski and Nasar (2003) highlights that urban areas face significant challenges related to visual pollution, including excessive billboards, neon signs, and poorly designed public spaces. These elements contribute to visual clutter and can negatively impact residents' mental health, stress levels, and overall quality of life. The study emphasizes that the constant exposure to visually overwhelming stimuli in urban settings can lead to higher levels of cognitive and emotional stress (Cackowski & Nasar, 2003).

4.1.2 Challenges of Visual Pollution in Rural Settings

In contrast, rural settings often face different challenges related to visual pollution. Studies, such as those by Zube et al. (1987), reveal that while rural areas might experience less intensity of visual clutter compared to urban settings, they still encounter issues related to visual pollution. Rural visual pollution often involves intrusive elements such as large industrial installations or unsightly agricultural structures. These elements can disrupt the natural landscape and affect residents' perception of their environment, leading to dissatisfaction and decreased quality of life (Zube et al., 1987).

4.1.3 Urban vs. Rural Visual Pollution: Unique Challenges

The comparison of urban and rural visual pollution reveals distinct challenges in each context. A study by Arriaza et al. (2004) demonstrates that urban visual pollution typically involves high-density, man-made elements such as advertisements and high-rise buildings, which create a visually overwhelming environment. In contrast, rural visual pollution may be less frequent but can be just as disruptive, often involving large-scale industrial or infrastructural elements that mar the natural landscape. Each setting requires tailored approaches to mitigate visual pollution and improve residents' quality of life (Arriaza et al., 2004).

4.1.4 Impacts on Well-Being in Urban vs. Rural Settings

The impact of visual pollution on well-being varies between urban and rural settings. According to a study by Scopelliti and Giuliani (2004), urban environments with high visual pollution often led to increased stress and lower life satisfaction due to the constant exposure to disorganized and intrusive visual elements. Conversely, in rural settings, visual pollution may not be as constant but can significantly affect residents when it occurs, particularly when it disrupts the perceived natural beauty of the landscape. Both settings demonstrate that visual pollution negatively impacts well-being but through different mechanisms and intensities (Scopelliti & Giuliani, 2004).

4.2 Developed vs. Developing Countries:

4.2.1 Manifestations of Visual Pollution in Developed Countries

In developed countries, visual pollution often manifests through extensive urban development, high-density signage, and intrusive advertising. Research by Guite et al. (2006) highlights that developed nations frequently face issues such as excessive billboard advertisements, neon lights, and architectural designs that contribute to visual clutter. These elements can lead to aesthetic degradation of the urban environment and affect residents' mental well-being. The study underscores that in developed countries, the focus of visual pollution is often on the impact of commercial and infrastructural elements on the urban landscape (Guite et al., 2006).

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

4.2.2 Manifestations of Visual Pollution in Developing Countries

In developing countries, visual pollution is often characterized by a combination of rapid urbanization, informal settlements, and inadequate waste management. A study by Andjarsari et al. (2022) shows that developing countries face unique challenges such as unregulated billboards, poorly planned urban infrastructure, and unmanaged waste disposal, which contribute to visual clutter. These factors can result in significant aesthetic and health impacts, as the chaotic and unplanned development can lead to a lower quality of living conditions and increased exposure to stressors (Andjarsari et al., 2022).

4.2.3 Health Impacts in Developed Countries

In developed countries, the health impacts of visual pollution are linked to psychological stress and decreased quality of life. The residents in visually polluted urban environments may experience higher levels of stress and dissatisfaction due to constant exposure to excessive and disorganized visual stimuli. This can lead to mental health issues such as anxiety and depression. The research emphasizes that the aesthetic quality of urban environments plays a crucial role in maintaining mental well-being in developed nations (Sugiyama et al., 2008).

4.2.4 Health Impacts in Developing Countries

In developing countries, the health impacts of visual pollution are often compounded by broader socio-economic issues. Research by Danda and colleagues (2016) indicates that visual pollution in these regions can exacerbate health problems related to poor sanitation and inadequate infrastructure. The chaotic visual environment can contribute to stress, anxiety, and lower overall quality of life. Additionally, the lack of effective urban planning and waste management can further degrade the living conditions, impacting both physical and mental health.

5. VULNERABLE POPULATIONS

5.1 Children and Adolescents:

5.1.1 Impact of Visual Pollution on Children's Educational Environments

Visual pollution in educational settings, such as overcrowded classrooms and excessive signage, can significantly affect younger populations. A study by Zazzi and Faragher (2018) found that excessive visual clutter in classrooms can impair students' ability to concentrate and process information. The study highlights that classrooms with distracting visual elements may lead to decreased academic performance and increased stress levels among students (Zazzi & Faragher, 2018).

5.1.2 Distraction and Cognitive Load

Research by Cohen et al. (2013) suggests that visual pollution can increase cognitive load and distraction in educational environments. The study discusses how visual distractions, such as poorly designed learning materials or excessive decorations, can reduce students' attention span and memory retention. This increased cognitive load can hinder students' learning processes and overall academic achievement (Cohen et al., 2013).

5.1.3 Impact on Behavioral and Emotional Well-Being

Visual pollution in educational settings can also affect children's behavioral and emotional well-being. According to research by Rodrigues and Pandeirada (2018), children exposed to visually polluted environments may experience increased levels of anxiety and behavioral issues. The study highlights that an environment with excessive visual stimuli can contribute to feelings of overstimulation and emotional distress among students (Rodrigues & Pandeirada, 2018).

5.1.4 Long-Term Developmental Effects

Long-term exposure to visual pollution in educational settings can have lasting effects on children's development. A longitudinal study by Black et al. (2019) shows that persistent exposure to visually cluttered environments can impact children's cognitive development and academic performance over time. The research emphasizes the importance of creating visually supportive educational environments to foster better long-term outcomes for students (Black et al., 2019).

5.2 Elderly:

5.2.1 Increased Sensitivity of the Elderly to Visual Pollution

Elderly individuals are particularly sensitive to visual pollution due to age-related changes in visual perception and cognitive function. A study by Mangione et al. (1999) highlights that older adults often experience diminished visual acuity and contrast sensitivity, making them more vulnerable to the negative effects of visual clutter. The research indicates that excessive visual stimuli can exacerbate visual discomfort and cognitive overload in this population (Mangione et al., 1999).

5.2.2 Mental Health Effects

Visual pollution can also impact the mental health of the elderly. According to research by Bai and Jin (2023), exposure to visually cluttered environments is associated with increased levels of stress, anxiety, and depression among older adults. The study points

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

out that elderly individuals may have a reduced ability to cope with visual overload, leading to heightened emotional distress and diminished quality of life (Bai & Jin, 2023).

5.2.3 Physical Health Impacts

The physical health of elderly individuals can also be affected by visual pollution. Research by Zazzi and Faragher (2018) shows that visually cluttered environments can lead to increased risks of falls and accidents in older adults. The study suggests that visual distractions can impair spatial orientation and depth perception, contributing to a higher incidence of physical injuries (Zazzi & Faragher, 2018).

5.2.4 Cognitive Function and Visual Pollution

Cognitive function in the elderly can be adversely affected by visual pollution. A study by Schilling and colleagues (2019) finds that older adults exposed to environments with excessive visual stimuli may experience accelerated cognitive decline. The research indicates that visual clutter can interfere with cognitive processes such as attention and memory, which are already vulnerable in aging populations.

5.3 Socioeconomically Disadvantaged Groups:

5.3.1 Visual Pollution and Lower-Income Communities

Visual pollution disproportionately affects lower-income communities due to higher exposure to visually cluttered environments. A study by Lovell et al. (2018) found that lower-income neighborhoods often face increased levels of visual pollution due to factors such as poor urban planning and inadequate infrastructure. These areas are more likely to have neglected or dilapidated spaces that contribute to a higher visual clutter, impacting residents' quality of life (Lovell et al., 2018).

5.3.2 Health Disparities Linked to Visual Pollution

Visual pollution in lower-income communities exacerbates existing health disparities. Research by Williams et al. (2019) highlights that residents in these areas face greater health challenges due to the combined effects of visual pollution and socio-economic stressors. The study emphasizes that visual pollution can aggravate stress and mental health issues, further widening health inequalities between higher and lower-income populations.

5.3.3 Socio-Economic Factors and Exposure to Visual Pollution

Lower-income communities are more likely to be situated near sources of visual pollution, such as industrial areas and busy roadways (Bullard, 2018). A study by Maantay et al. (2016) discusses how socio-economic factors contribute to higher exposure levels in these communities. The research shows that lower-income areas often lack green spaces and are characterized by high-density development, which increases residents' exposure to visual clutter (Maantay et al., 2016).

5.3.4 Impact on Quality of Life and Well-Being

The impact of visual pollution on quality of life and well-being is more pronounced in lower-income communities. According to research by Mitchell and Popham (2008), the visual environment in these communities can lead to diminished psychological well-being and increased stress levels. The study underscores that the cumulative effects of visual pollution and socio-economic disadvantages can significantly reduce the overall quality of life for residents (Mitchell & Popham, 2008).

6. MITIGATION STRATEGIES

6.1 Urban Planning and Design:

6.1.1 Role of Urban Planning in Reducing Visual Pollution

Green Spaces: Incorporating green spaces into urban planning is a key strategy for mitigating visual pollution. Research by Kothencz et al. (2017) demonstrates that urban parks and green belts can provide visual relief and enhance the aesthetic appeal of cities. Green spaces not only reduce visual clutter but also contribute to improved mental health and well-being by offering residents a visually pleasant environment (Kothencz et al., 2017).

Zoning Regulations: Effective zoning regulations play a significant role in controlling visual pollution by guiding the placement and design of buildings and infrastructure. A study by Fong and Kothari (2015) emphasizes that comprehensive zoning laws can prevent incompatible land uses and reduce the impact of visually disruptive elements, such as billboards and high-density developments.

Aesthetic Guidelines: Implementing aesthetic guidelines in urban design can effectively reduce visual pollution. According to a study by Rapoport (2017), aesthetic guidelines that emphasize harmonious design and architectural coherence can enhance the visual quality of urban environments. These guidelines help ensure that new developments contribute positively to the overall visual landscape.

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

6.2 Regulatory Measures:

6.2.1 Effectiveness of Regulations on Outdoor Advertising

Outdoor Advertising Regulations: Regulations on outdoor advertising are crucial for mitigating visual pollution. Studies show that strict guidelines on billboard sizes, placement, and lighting can significantly reduce visual clutter. A study by Wakil et al. (2019) evaluated the effectiveness of billboard regulations in several major cities and found that cities with stringent controls reported improved visual aesthetics and reduced public complaints about visual pollution (Wakil et al., 2019).

6.2.2 Effectiveness of Industrial Design Regulations

Industrial Design Regulations: Regulations on industrial design can play a significant role in reducing visual pollution by controlling the appearance and location of industrial facilities. According to research by Sumartono (2009), effective industrial design regulations help ensure that industrial buildings and equipment are aesthetically integrated into their surroundings, reducing their visual impact on nearby residential and commercial areas (Sumartono, 2009).

6.2.3 Effectiveness of Waste Management Regulations

Waste Management Regulations: Proper waste management regulations are essential for mitigating visual pollution from litter and illegal dumping. A study by Ahmed et al. (2019) found that cities with comprehensive waste management programs, including regular waste collection and strict penalties for illegal dumping, experienced lower levels of visible waste and improved urban aesthetics (Ahmed et al., 2019).

CONCLUSIONS

The article concludes that visual pollution significantly impacts both the environment and human health, with negative effects more pronounced in vulnerable populations such as lower-income communities, children, and the elderly. The study highlights that visual pollution leads to stress, anxiety, and reduced quality of life due to cluttered, unattractive environments. It also emphasizes the disparities in exposure, where lower-income areas face higher levels of visual pollution due to inadequate infrastructure and urban planning.

Mitigation strategies discussed in the article include incorporating green spaces, implementing strict zoning regulations, enforcing outdoor advertising controls, and improving waste management practices. The conclusion stresses the importance of integrated urban planning and regulatory measures to reduce visual pollution and enhance the aesthetic quality of living spaces, thereby improving overall well-being.

REFERENCES

- 1) Ahmed, N., Islam, M. N., Tuba, A. S., Mahdy, M. R. C., & Sujauddin, M. (2019). Solving visual pollution with deep learning: A new nexus in environmental management. *Journal of environmental management*, 248, 109253. <https://doi.org/10.1016/j.jenvman.2019.07.024>
- 2) Andjarsari, S., Subadyo, A. T., & Bonifacius, N. (2022, March). Safe construction and visual pollution of billboards along Main Street. In *IOP conference series: earth and environmental science* (Vol. 999, No. 1, p. 012015). IOP Publishing. <https://doi.org/10.1088/1755-1315/999/1/012015>
- 3) Angel, S. (2012). *Planet of cities* (p. 360). Cambridge, MA: Lincoln Institute of Land Policy. https://wagner.nyu.edu/files/faculty/publications/PlanetofCities_Shloomo_Web_Chapter.pdf
- 4) Appleyard, D. (1979). The environment as a social symbol: Within a theory of environmental action and perception. *Journal of the American Planning Association*, 45(2), 143-153. <https://doi.org/10.1080/01944367908976952>
- 5) Arriaza, M., Cañas-Ortega, J. F., Cañas-Madueño, J. A., & Ruiz-Aviles, P. (2004). Assessing the visual quality of rural landscapes. *Landscape and urban planning*, 69(1), 115-125. <https://doi.org/10.1016/j.landurbplan.2003.10.029>
- 6) Azumah, D. M. Y., Hinson, R. E., Nukpezah, D., & Yiran, G. A. B. (2021). Visual pollution through excessive outdoor advertisements. *Marketing Communications in Emerging Economies, Volume I: Foundational and Contemporary Issues*, 193-228. https://doi.org/10.1007/978-3-030-81329-1_8
- 7) Baddeley, A. (2020). Working memory. In *Memory* (pp. 71-111). Routledge. <https://doi.org/10.4324/9780429449642>
- 8) Bai, Y., & Jin, H. (2023). Effects of visual, thermal, and acoustic comfort on the psychological restoration of the older people in a severe cold city. *Building and Environment*, 239, 110402. <https://doi.org/10.1016/j.buildenv.2023.110402>
- 9) Banire, B., Al-Thani, D., Qaraq, M., Khowaja, K., & Mansoor, B. (2020). The effects of visual stimuli on attention in children with autism spectrum disorder: an eye-tracking study. *IEEE Access*, 8, 225663-225674. <https://doi.org/10.1109/ACCESS.2020.3045042>

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

- 10) Berleant, A. (1997). Living in the landscape: Toward an aesthetics of environment. University press of Kansas. <https://doi.org/10.1177/002216789503500305>
- 11) Berto, R. (2005). Exposure to restorative environments helps restore attentional capacity. *Journal of environmental psychology*, 25(3), 249-259. <https://doi.org/10.1016/j.jenvp.2005.07.001>
- 12) Black, S. A., McConnell, E. L., McKerr, L., McClelland, J. F., Little, J. A., Dillenburger, K., ... & Saunders, K. J. (2019). In-school eyecare in special education settings has measurable benefits for children's vision and behaviour. *PLoS One*, 14(8), e0220480. <https://doi.org/10.1371/journal.pone.0220480>
- 13) Blehm, C., Vishnu, S., Khattak, A., Mitra, S., & Yee, R. W. (2005). Computer vision syndrome: a review. *Survey of ophthalmology*, 50(3), 253-262. <https://doi.org/10.1016/j.survophthal.2005.02.008>
- 14) Bond, S., & Hopkins, J. (2000). The impact of transmission lines on residential property values: results of a case study in a suburb of Wellington, NZ. *Pacific Rim property research journal*, 6(2), 52-60. <https://doi.org/10.1080/14445921.2000.11104090>
- 15) Bordenave, G., & Lung, Y. (1996). New spatial configurations in the European automobile industry. *European Urban and Regional Studies*, 3(4), 305-321. <https://doi.org/10.1177/096977649600300403>
- 16) Bullard, R. D. (2018). *Dumping in Dixie: Race, class, and environmental quality*. Routledge. <https://doi.org/10.4324/9780429495274>
- 17) Cackowski, J. M., & Nasar, J. L. (2003). The restorative effects of roadside vegetation: Implications for automobile driver anger and frustration. *Environment and behavior*, 35(6), 736-751. <https://doi.org/10.1177/0013916503256267>
- 18) Carmona, M. (2021). *Public places urban spaces: The dimensions of urban design*. Routledge. <https://doi.org/10.4324/9781315158457>
- 19) Carver, C. S., & Scheier, M. F. (2001). *On the self-regulation of behavior*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511801125>
- 20) Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of personality and social psychology*, 58(6), 1015.
- 21) Cohen, S., Evans, G. W., Stokols, D., & Krantz, D. S. (2013). *Behavior, health, and environmental stress*. Springer Science & Business Media. <https://doi.org/10.1007/978-1-4757-9380-2>
- 22) Crawford, M. (1992). *The world in a shopping mall*. na.
- 23) Dul, J., & Ceylan, C. (2011). Work environments for employee creativity. *Ergonomics*, 54(1), 12-20. <https://doi.org/10.1080/00140139.2010.542833>
- 24) Evans, G. W. (2003). The built environment and mental health. *Journal of urban health*, 80, 536-555. <https://doi.org/10.1093/jurban/jtg063>
- 25) Evans, G. W. (Ed.). (1984). *Environmental stress*. CUP Archive.
- 26) Evans, G. W., & Wachs, T. D. (2010). Chaos and its influence on children's development. Washington, DC: American Psychological Association, 6(2-3), 66-80. <https://psycnet.apa.org/fulltext/2009-08920-000-FRM.pdf>
- 27) Fieni, D. (2016). Graffiti and street art in Paris. In *Routledge Handbook of Graffiti and Street Art* (pp. 288-300). Routledge. <https://doi.org/10.4324/9781315761664>
- 28) Fisher, A., & Kloos, H. (2016). Development of selective sustained attention: The role of executive functions. <https://doi.org/10.1037/14797-010>
- 29) Forgy, D. G., & Forgy, D. K. (1992). Creativity enhancement through flotation isolation. *Journal of Environmental Psychology*, 12(4), 329-335. [https://doi.org/10.1016/S0272-4944\(05\)80081-7](https://doi.org/10.1016/S0272-4944(05)80081-7)
- 30) Froe, M. D. (2023). *Guidelines for augmented reality advertising: A consumer ethical impact assessment tool* (Master's thesis). <https://studenttheses.uu.nl/handle/20.500.12932/44572>
- 31) Gao, H., Bakar, S. A., Maulan, S., Yusof, M. J. M., Mundher, R., Guo, Y., & Chen, B. (2024). A Systematic Literature Review and Analysis of Visual Pollution. *Land*, 13(7), 994. <https://doi.org/10.3390/land13070994>
- 32) Gifford, R. (2014). Environmental psychology matters. *Annual review of psychology*, 65(1), 541-579. <https://doi.org/10.1146/annurev-psych-010213-115048>
- 33) Guite, H. F., Clark, C., & Ackrill, G. (2006). The impact of the physical and urban environment on mental well-being. *Public health*, 120(12), 1117-1126. <https://doi.org/10.1016/j.puhe.2006.10.005>
- 34) Habitat, U. N. (2013). *State of the world's cities 2012/2013: Prosperity of cities*. Routledge. <https://doi.org/10.4324/9780203756171>

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

- 35) Ho, G., Scialfa, C. T., Caird, J. K., & Graw, T. (2001). Visual search for traffic signs: The effects of clutter, luminance, and aging. *Human factors*, 43(2), 194-207. <https://doi.org/10.1518/001872001775900922>
- 36) Hull, R. B., & Bishop, I. D. (1988). Scenic impacts of electricity transmission towers: The influence of landscape type and observer distance. *Journal of Environmental Management*, 27(1), 99-108.
- 37) Jana, M. K., & De, T. (2015). Visual pollution can have a deep degrading effect on urban and suburban community: a study in few places of Bengal, India, with special reference to unorganized billboards. *European Scientific Journal*. <https://core.ac.uk/download/pdf/236417101.pdf>
- 38) Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective*. Cambridge university press. <https://doi.org/10.1017/CBO9780511623286>
- 39) Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of environmental psychology*, 15(3), 169-182. [https://doi.org/10.1016/0272-4944\(95\)90001-2](https://doi.org/10.1016/0272-4944(95)90001-2)
- 40) Kavaratzis, M. (2005). Place branding: A review of trends and conceptual models. *The marketing review*, 5(4), 329-342. <https://doi.org/10.1362/146934705775186854>
- 41) Kelling, G. L., & Coles, C. M. (1997). *Fixing broken windows: Restoring order and reducing crime in our communities*. Simon and Schuster.
- 42) Kjellstrom, T., & Mercado, S. (2008). Towards action on social determinants for health equity in urban settings. *Environment and Urbanization*, 20(2), 551-574. <https://doi.org/10.1177/0956247808096128>
- 43) Kothencz, G., Kolcsár, R., Cabrera-Barona, P., & Szilassi, P. (2017). Urban green space perception and its contribution to well-being. *International journal of environmental research and public health*, 14(7), 766. <https://doi.org/10.3390/ijerph14070766>
- 44) Lackey, N. Q., Tysor, D. A., McNay, G. D., Joyner, L., Baker, K. H., & Hodge, C. (2021). Mental health benefits of nature-based recreation: a systematic review. *Annals of Leisure Research*, 24(3), 379-393. <https://doi.org/10.1080/11745398.2019.1655459>
- 45) Lin, J. B., Gerratt, B. W., Bassi, C. J., & Apte, R. S. (2017). Short-wavelength light-blocking eyeglasses attenuate symptoms of eye fatigue. *Investigative ophthalmology & visual science*, 58(1), 442-447. <https://doi.org/10.1167/iovs.16-20663>
- 46) Lovell, R., Depledge, M., & Maxwell, S. (2018). Health and the natural environment: A review of evidence, policy, practice and opportunities for the future.
- 47) Lynch, K. (1960). *The image of the city*/Lynch Kevin.
- 48) Maantay, J., Chakraborty, J., & Brender, J. (2010, March). Proximity to environmental hazards: Environmental justice and adverse health outcomes. In *Strengthening environmental justice research and decision making: a symposium on the science of disproportionate environmental health impacts* (pp. 17-19). <https://archive.epa.gov/ncer/ej/web/pdf/brender.pdf>
- 49) Mangione, C. M., Gutierrez, P. R., Lowe, G., Orav, E. J., & Seddon, J. M. (1999). Influence of age-related maculopathy on visual functioning and health-related quality of life. *American journal of ophthalmology*, 128(1), 45-53. [https://doi.org/10.1016/S0002-9394\(99\)00169-5](https://doi.org/10.1016/S0002-9394(99)00169-5)
- 50) McCay, L., Bremer, I., Endale, T., Jannati, M., & Yi, J. (2019). Urban design and mental health. *Urban mental health*, 32, 1-3.
- 51) Mitchell, R., & Popham, F. (2008). Effect of exposure to natural environment on health inequalities: an observational population study. *The lancet*, 372(9650), 1655-1660. [https://doi.org/10.1016/S0140-6736\(08\)61689-X](https://doi.org/10.1016/S0140-6736(08)61689-X)
- 52) Nasar, J. L. (1990). The evaluative image of the city. *Journal of the American Planning Association*, 56(1), 41-53. <https://doi.org/10.1080/01944369008975742>
- 53) Nasar, J. L. (1994). Urban design aesthetics: The evaluative qualities of building exteriors. *Environment and behavior*, 26(3), 377-401. <https://doi.org/10.1177/001391659402600305>
- 54) Nasar, J. L. (Ed.). (1992). *Environmental aesthetics: Theory, research, and application*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511571213>
- 55) Nessim, A. A. (2020). Visual pollution: an approach to reduce the environmental impact of light pollution in Egypt. In *Architecture and Urbanism: A Smart Outlook: Proceedings of the 3rd International Conference on Architecture and Urban Planning, Cairo, Egypt* (pp. 469-481). Springer International Publishing. https://doi.org/10.1007/978-3-030-52584-2_33
- 56) Pacione, M. (2009). *Urban Geography: A Global Perspective*.
- 57) Palmer, J. F. (2004). Using spatial metrics to predict scenic perception in a changing landscape: Dennis, Massachusetts. *Landscape and urban Planning*, 69(2-3), 201-218. <https://doi.org/10.1016/j.landurbplan.2003.08.010>
- 58) Porteous, J. D. (2013). *Environmental aesthetics: Ideas, politics and planning*. routledge.

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

<https://doi.org/10.4324/9780203437322>

- 59) Punter, J. (2007). Developing urban design as public policy: Best practice principles for design review and development management. *Journal of Urban design*, 12(2), 167-202. <https://doi.org/10.1080/13574800701306195>
- 60) Punter, J. (2017). Aesthetics in planning. *Values and planning*, 38-67. <https://doi.org/10.4324/9781315235141>
- 61) Purcell, T., Peron, E., & Berto, R. (2001). Why do preferences differ between scene types?. *Environment and behavior*, 33(1), 93-106. <https://doi.org/10.1177/00139160121972882>
- 62) Rathje, W. L., & Murphy, C. (2001). *Rubbish!: the archaeology of garbage*. University of Arizona Press.
- 63) Rodrigues, P. F., & Pandeirada, J. N. (2018). When visual stimulation of the surrounding environment affects children's cognitive performance. *Journal of experimental child psychology*, 176, 140-149. <https://doi.org/10.1016/j.jecp.2018.07.014>
- 64) Rosenfield, M. (2011). Computer vision syndrome: a review of ocular causes and potential treatments. *Ophthalmic and Physiological Optics*, 31(5), 502-515. <https://doi.org/10.1111/j.1475-1313.2011.00834.x>
- 65) Sagvan Ageed, Najmadin E. Hassan and Salih F. Ismael (2019). Repercussion of Visual Pollution and its Effects on Some People in Duhok Governorate/Iraq. *International Journal of Current Advanced Research*, 08(01), pp. 16918-16921. <http://dx.doi.org/10.24327/ijcar>
- 66) Salwa, M. (2022). Landscape Aesthetics and Politics. In *Aesthetic Perspectives on Culture, Politics, and Landscape: Appearances of the Political* (pp. 83-100). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-77830-9_7
- 67) Schultz, P. W., Bator, R. J., Large, L. B., Bruni, C. M., & Tabanico, J. J. (2013). Littering in context: Personal and environmental predictors of littering behavior. *Environment and Behavior*, 45(1), 35-59. <https://doi.org/10.1177/0013916511412179>
- 68) Scopelliti, M., & Giuliani, M. V. (2004). Choosing restorative environments across the lifespan: A matter of place experience. *Journal of environmental psychology*, 24(4), 423-437. <https://doi.org/10.1016/j.jenvp.2004.11.002>
- 69) Shanmugathas, D. M. (2018). Billboard advertisement strategies. *International Journal of Application or Innovation in Engineering & Management (IJAIEM)*, 7(4). <https://ssrn.com/abstract=3208648>
- 70) Song, X., Wen, M., Shen, Y., Feng, Q., Xiang, J., Zhang, W., ... & Wu, Z. (2020). Urban vacant land in growing urbanization: An international review. *Journal of Geographical Sciences*, 30, 669-687. <https://doi.org/10.1007/s11442-020-1749-0>
- 71) Stamps, A. E. (2013). *Psychology and the aesthetics of the built environment*. Springer Science & Business Media. <https://doi.org/10.1007/978-1-4615-4223-4>
- 72) Stokols, D. (1981). People in places: A transactional view of settings. *Cognition, Social Behavior, and the Environment/Lawrence Erlbaum*. <https://doi.org/10.4324/9781315805767-10>
- 73) Sugiyama, T., Leslie, E., Giles-Corti, B., & Owen, N. (2008). Associations of neighbourhood greenness with physical and mental health: do walking, social coherence and local social interaction explain the relationships?. *Journal of Epidemiology & Community Health*, 62(5), e9-e9. <https://doi.org/10.1136/jech.2007.064287>
- 74) Sullivan, W. C., & Chang, C. Y. (2011). Mental health and the built environment. *Making healthy places: Designing and building for health, well-being, and sustainability*, 106-116. https://doi.org/10.5822/978-1-61091-036-1_7
- 75) Sumartono, S. (2009). Visual pollution in the context of conflicting design requirements. *Jurnal Dimensi Seni Rupa dan Desain*, 6(2), 157-172. <https://doi.org/10.25105/dim.v6i2.1140>
- 76) Sumper, A., Boix-Aragones, O., Rull-Duran, J., Amat-Algaba, J., & Wagner, J. (2021). Assessment of the visual impact of existing high-voltage lines in Urban Areas. *Electricity*, 2(3), 285-299. <https://doi.org/10.3390/electricity2030017>
- 77) Swanwick, C. (2009). Society's attitudes to and preferences for land and landscape. *Land use policy*, 26, S62-S75. <https://doi.org/10.1016/j.landusepol.2009.08.025>
- 78) Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive science*, 12(2), 257-285. [https://doi.org/10.1016/0364-0213\(88\)90023-7](https://doi.org/10.1016/0364-0213(88)90023-7)
- 79) Ulrich, R. S. (1984). View through a window may influence recovery from surgery. *science*, 224(4647), 420-421. <https://doi.org/10.1126/science.6143402>
- 80) Ulrich, R. S., Simons, R. F., Losito, B. D., Fiorito, E., Miles, M. A., & Zelson, M. (1991). Stress recovery during exposure to natural and urban environments. *Journal of environmental psychology*, 11(3), 201-230. [https://doi.org/10.1016/S0272-4944\(05\)80184-7](https://doi.org/10.1016/S0272-4944(05)80184-7)
- 81) Wakil, K., Naeem, M. A., Anjum, G. A., Waheed, A., Thaheem, M. J., Hussnain, M. Q. U., & Nawaz, R. (2019). A hybrid tool for visual pollution Assessment in urban environments. *Sustainability*, 11(8), 2211. <https://doi.org/10.3390/su11082211>

Visual Pollution: Causes, Health Impacts, And Mitigation Strategies for Enhancing Environmental Aesthetics and Public Well-Being – A Review

- 82) Widyo Harsanto, P., & Raras Satuti, K. (2023). Impact of Advertisements on Public Spaces and Environmental Aesthetics: Insights from Indonesia. *Journal of the International Society for the Study of Vernacular Settlements*, 10(9), 210-227. <http://digilib.isi.ac.id/id/eprint/15249>
- 83) Williams, A. T., & Rangel-Buitrago, N. (2019). Marine litter: Solutions for a major environmental problem. *Journal of coastal research*, 35(3), 648-663. <https://doi.org/10.2112/JCOASTRES-D-18-00096.1>
- 84) Williams, D. R., Neighbors, H. W., & Jackson, J. S. (2003). Racial/ethnic discrimination and health: Findings from community studies. *American journal of public health*, 93(2), 200-208. <https://doi.org/10.2105/AJPH.93.2.200>
- 85) Zacharias, J. (2001). Pedestrian behavior pedestrian behavior and perception in urban walking environments. *Journal of planning literature*, 16(1), 3-18. <https://doi.org/10.1177/08854120122093249>
- 86) Zazzi, H., & Faragher, R. (2018). 'Visual clutter' in the classroom: voices of students with Autism Spectrum Disorder. *International Journal of Developmental Disabilities*, 64(3), 212-224. <https://doi.org/10.1080/20473869.2018.1468619>
- 87) Zheng, F., Hou, F., Chen, R., Mei, J., Huang, P., Chen, B., & Wang, Y. (2021). Investigation of the relationship between subjective symptoms of visual fatigue and visual functions. *Frontiers in neuroscience*, 15, 686740. <https://doi.org/10.3389/fnins.2021.686740>
- 88) Zube, E. H., Sell, J. L., & Taylor, J. G. (1982). Landscape perception: research, application and theory. *Landscape planning*, 9(1), 1-33. [https://doi.org/10.1016/0304-3924\(82\)90009-0](https://doi.org/10.1016/0304-3924(82)90009-0)



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