African Journal of Applied Research
Vol. 10, No. 2 (2024), pp. 203-226
http://www.ajaronline.com
http://doi.org/10.26437/ajar.01.12.2024.11
Special Issue: Applied Research Conference of Technical Universities in Ghana 2024
Received: December 19, 2023
Peer reviewed: June 28, 2024
Revised: December 6, 2024
Published: December 2024

MITIGATION STRATEGIES OF VISUAL POLLUTION ON HIGHWAYS IN THE BOLGATANGA MUNICIPAL, GHANA.

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ABSTRACT

Purpose: This study examines visual pollution along the Bolgatanga highway, focusing on outdoor advertising (OAs) and signage. It aims to identify the causes, assess impacts on road users, and propose strategies to mitigate visual pollution, addressing a critical gap in Ghanaian environmental policy and research.
Design/Methodology/Approach: A survey of 200 road users was conducted on a 3.4 km highway stretch between the Bolgatanga Regional Hospital Intersection and the STC Bus Terminal. Data were collected using a structured online questionnaire and photographic analysis of visual clutter. Descriptive statistics were used to analyse responses regarding demographics, causes of visual pollution, and its impacts.
Findings: The survey identified poorly maintained banners (47%) and large billboards with excessive text (39.5%) as primary contributors to visual clutter. Overhead signs also obstructed scenic views (21.5%). Road users expressed mixed views on OAs: 39.5% appreciated their navigation utility, while 31.5% found them distracting, particularly in high-traffic areas. Motorcyclists and pedestrians were especially vulnerable to visual distractions, increasing road safety concerns.
Research Limitation: The research is geographically confined to a single highway stretch in Bolgatanga, necessitating further studies across broader contexts to validate and extend the results.
Practical Implications: Improved design standards should prioritise safety and community aesthetics, with input from graphic design professionals.
Social Implication: Addressing visual pollution can improve road safety, reduce environmental stress, and enhance Bolgatanga's aesthetic and cultural identity, benefiting residents and visitors.
Originality/Value: This study is among the first to explore visual pollution in a Ghanaian municipality, highlighting its environmental and safety implications. It offers practical solutions integrating urban planning, graphic design, and public policy for a visually sustainable future.

Keywords*: Bolgatanga. highway signage. mitigation. outdoor advertising. visual pollution*

ISSN: 2408-7920

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INTRODUCTION

Environmental pollution is a well-documented concern, with established areas like land, air, water, and plastic pollution receiving significant attention (Appiah et al., 2017; Kanhai et al., 2021; Kombiok et al., 2021; Odonkor & Mahami, 2020; Tay, 2021). Research in Ghana reflects this trend. However, a different but significant environmental issue, visual pollution, has been largely ignored.

Visual pollution, characterised by excessive and distracting signage, disrupts the visual harmony of an environment. (Bodur & Kucur, 1994). It can have negative psychological and even physiological impacts, including eye fatigue, stress, and decreased well-being. (Azumah et al., 2021; Yilmaz and Sağsöz, 2011). Highways, crucial transportation routes, are particularly prone due to high infrastructural development and population density in urban centres.

Despite its prevalence, visual pollution is mainly absent from official environmental reports and policies in Ghana (EPA, 2017; GSS/EPA, 2020). This lack of recognition allows the proliferation of billboards, posters, and banners, often placed haphazardly, with unknown consequences for the Ghanaian populace. The absence of a comprehensive outdoor advertisement database further hinders effective management (Azumah et al., 2021).

Although visual pollution is prevalent in Built Environments, its measurement and control remain debated due to its subjectivity (Azumah et al., 2021). Different urban contexts and cultural backgrounds can influence visual preferences (Portella, 2014). What one person finds visually distracting or overwhelming, another might perceive as stimulating or even aesthetically pleasing. This subjectivity makes it difficult to establish universally accepted metrics for measuring visual clutter.

Furthermore, cultural background can significantly influence visual preferences. Research by Portella (2014) highlights how cultural norms and values can shape what people find aesthetically pleasing or visually jarring in their environment. For instance, a brightly coloured billboard that might be considered visually overwhelming in a minimalist Scandinavian context could be seen as vibrant and culturally relevant in the cultural setting of Bolgatanga.

Graphic designers are often responsible for creating these polluting elements, whose work shapes the visual landscape. While their role is seldom acknowledged in discussions of visual pollution, their choices regarding imagery, type, colour, and size significantly contribute to the problem.

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To address these challenges, a proposed advertising bill by the Advertising Association of Ghana (AAG) has been drafted as part of ongoing efforts to regulate the advertising industry in Ghana, specifically regarding billboard placement and other outdoor advertisements. The lack of a formalised law allows visual pollution to persist. This has led the AAG to call for public support to pressure the government and parliament to pass the proposed Advertising Bill into law finally (Donkor, 2024). This research can contribute valuable data to support the arguments for passing the Advertising Bill and implementing stricter regulations on outdoor advertising in Ghana.

The current dearth of research on visual pollution in Ghana, particularly within municipalities like Bolgatanga, necessitates a comprehensive investigation. This study investigates visual pollution on highways in Bolgatanga, Ghana, focusing on the effects of outdoor advertising (OAs) and signage. This study aims to identify the causes of visual pollution in Bolgatanga.
To Assess the impacts of outdoor advertising (OAs) and signage on road users. To determine the mitigation strategies to reduce visual pollution in Bolgatanga.

By addressing these objectives, this research will contribute to raising awareness and advocating for the inclusion of visual pollution in environmental discourse and policymaking in Ghana.

LITERATURE REVIEW

Visual pollution is the alteration of the environment that disrupts the visual experience. (Bodur and Kucur, 1994; Öner and Konakl, 2009), is a growing concern. It was initially focused on excessive signage and advertisements. (Ashihara, 1983; Cullen, 2000; Nasar, 1992; Passini, 1992), it now encompasses any element creating an unpleasant visual experience, including littered waste (Nagle, 2009) and inappropriate infrastructure (Jensen et al., 2014; Nagle, 2009; Sumartono, 2009). This reflects a broader understanding of visual pollution's impact beyond aesthetics (Mohammadi-Mehr et al., 2018).

Wakil et al.'s (2019) concept of visual pollution objects (VPOs) highlights how man-made elements can negatively affect the visual quality of urban environments. This is particularly relevant on highways, where factors like wheeled bins, signboards, and billboards contribute to visual clutter (Yilmaz & Sağsöz, 2011). Unsightly elements like satellite dishes, electrical infrastructure, and air conditioners mounted on building exteriors further exacerbate the problem.

Öner and Konakl (2009) identify various reasons for visual pollution, including poor decision-making, inadequate regulations, and public awareness. These factors necessitate comprehensive strategies to address visual pollution and enhance the visual quality of highway landscapes.

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Visual pollution can significantly impact highways in densely populated areas, where a visually appealing environment is crucial for safe and enjoyable travel. Excessive visual stimuli can distract drivers, reducing visibility and increasing cognitive load, leading to compromised road safety and driver stress (Yilmaz & Sağsöz, 2011). Additionally, visual clutter diminishes the scenic value of roadways, detracting from the travel experience for all users.

Literature suggests that outdoor advertising (OA) can be a source of distraction, annoyance, and potential psychological effects (Öner & Konakl, 2009). Overly large or poorly designed OAs, unregulated signage and poor maintenance exacerbate visual pollution and potentially compromise road safety. Balancing safety, aesthetics, and commercial interests remains challenging, particularly concerning OA.

While this study focuses on OA and signage, the broader definition of visual pollution will be considered. The following section delves deeper into regulations, design considerations, and potential impacts of OA on highways. It will also explore how graphic designers can contribute to developing responsible and visually appealing solutions that meet the needs of both businesses and public safety.

Regulations, Design of Outdoor Advertising (OA) and Signage

Outdoor advertising (OA) presents a complex highway issue, particularly billboards, posters, banners, and hoardings. While offering undeniable benefits to businesses through brand awareness and product promotion (Taylor et al., 2006), unregulated OA can create many problems. Billboards leverage their prominent placement for high visibility, but their proliferation can lead to visual clutter, diminishing the landscape's aesthetic appeal and contributing to visual pollution (Wakil et al., 2019). Research by Azumah et al. (2021) highlights OA as a significant source of visual pollution, particularly in developing countries like Ghana.

While the focus has been on OA, it is important to remember the broader definition of visual pollution. Excessive and poorly designed OA can compete for driver attention, potentially increasing the risk of accidents (Hudák & Madleňák, 2016). Telephone wires, poles, poorly designed infrastructure, and inadequate signage all contribute to visual clutter (Cengiz & Cengiz, 2015). Addressing these issues requires a holistic approach considering the overall visual experience on highways.

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Research suggests a clear link between billboards and driver distraction. Studies suggest drivers may be drawn to billboards longer than necessary, diverting focus from crucial traffic signs (Hudák & Madleňák, 2016). Other researchers have shown that billboards can attract drivers' attention for longer durations than traffic signs, potentially increasing reaction times and contributing to accidents (Anani and Appiah, 2019; Edegoh et al., 2013; Zekiri, 2019). Unregulated OA has also been linked to mental health implications and cultural degradation (Bendak & Al-Saleh, 2010; Edquist et al., 2011). Reviews of collision rates suggest a correlation between billboards and higher crash rates, particularly at junctions (Farbry et al., 2001; Gunatillake et al., 2000; Wallace, 2003).

It is crucial to balance the economic benefits of OA and the negative consequences of visual pollution and driver distraction. This will require effective regulations and responsible graphic design practices.

Countries worldwide have adopted diverse regulations to address uncontrolled OA. These range from a complete ban, as seen in Sao Paulo's "clean city law"(Da Silva, 2020), to milder management approaches. Examples include China and Pakistan, which have implemented regulatory frameworks governing the placement, size, colour, and content of outdoor advertisements (Hasnain, 2013; Shrivastava & Choudhary, 2016). Canberra, Australia, stands out as a successful case with minimal billboard proliferation due to a long-standing ordinance that effectively regulated unauthorised signage (Fettes, 2017).

The examples of Sao Paulo and Canberra demonstrate the potential benefits of stricter regulations. However, a well-rounded discussion on OA regulations should acknowledge the potential downsides of stricter controls. Research often neglects the economic arguments for outdoor advertising, such as reduced revenue for businesses and media companies. It is important to explore the effectiveness of different approaches – does a complete ban necessarily produce better outcomes than well-designed placement and size restrictions?

The lack of a comprehensive OA database and clear regulations hinders informed decision-making in Ghana (Azumah et al., 2021). To create effective regulations, factors like the ad's benefit, design, societal impact, urban integration, and driver distraction potential should be considered (Ramanathan, 2011).

Matching economic benefits with visual appeal and safety requires collaboration. Graphic designers can play a crucial role by advocating for design standards. Working with policymakers can help establish clear design guidelines for OA, limiting size, placement, and visual complexity to ensure the ads integrate seamlessly with the surroundings.

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By implementing clear regulations, promoting responsible design practices, and fostering collaboration, a win-win situation could be created for businesses and the visual environment. This will ensure that highways serve as efficient transportation corridors and visually enriching experiences for all road users.

Visual pollution on highways is a complex issue that requires economic, safety, and aesthetic considerations. By implementing a balanced approach that combines effective regulations, responsible design practices, and a holistic understanding of visual pollution, safer and more visually appealing highways can be created for all.

METHODOLOGY

This study investigates visual pollution in Bolgatanga, the regional capital of the Upper East Region of Ghana, a municipality with a population of about 140,000 (Ghana Statistical Service, 2021). The target population included road users of the 3.4 km highway stretch between the Bolgatanga Regional Hospital Intersection and the State Transport Corporation (STC) Bus Terminal. This is a busy route with high traffic density and a history of accidents due to factors like serving as a critical link to Navrongo and Burkina Faso and the presence of bus terminals, traffic lights, petrol stations, law court, regional and district offices, numerous churches and commercial activity. It also has many advertising media and signages along the road. The selected road stretch is shown in Figure 1.

A Google Form questionnaire was distributed online via WhatsApp from August 1st to 14th, 2023. The questionnaire consisted of three sections: (a) Demographics: assessed respondents' knowledge of visual pollution. (b) Causes of visual pollution: identified pollutants along the highway. (c) Impact on road users: explored how visual pollution affects respondents.

Convenience sampling was used, targeting accessible individuals like people at institutions near the highway, bus station patrons, pedestrians, and vendors along the route. A total of 200 responses were collected. Visual data was collected through photographs capturing key incidences of visual clutter along the highway.

IBM SPSS Statistics 27 and Excel 2016 were used to analyse the data. The results will be presented in tables and graphs. Before starting the online survey, participants provided informed consent.

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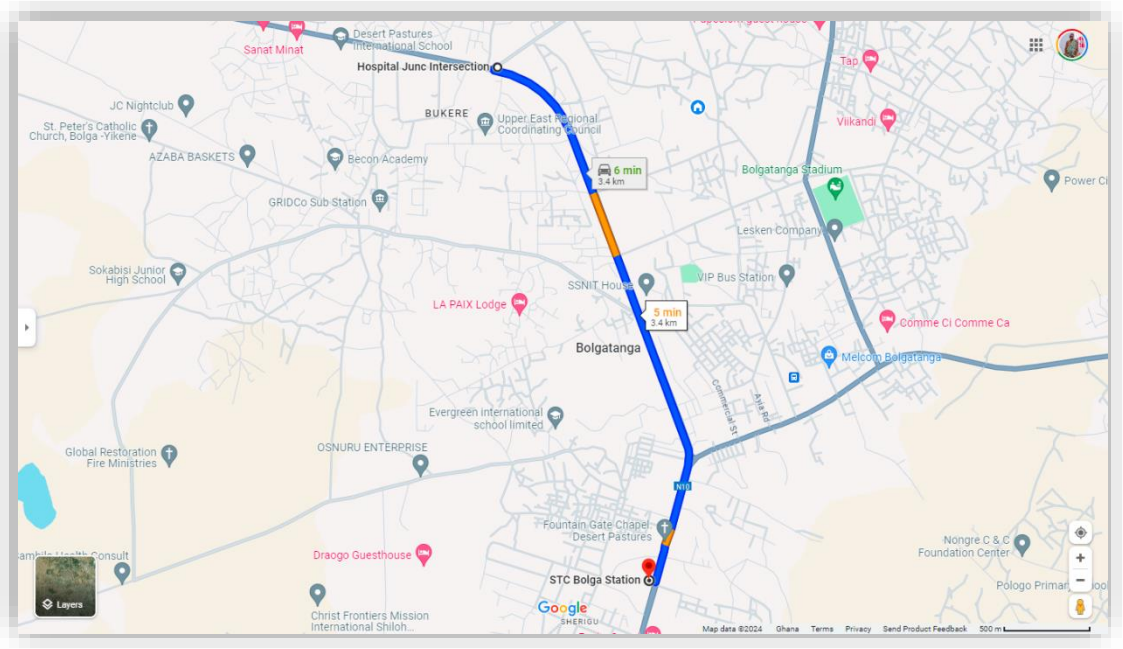

Source: Google Maps, 2024

Figure 1: The selected roadway between Bolgatanga Regional Hospital Intersection and the (STC) Bus Terminal.

FINDINGS

This report summarises the findings of a survey conducted to investigate visual pollution along highways between the Bolgatanga Regional Hospital Intersection and the (STC) Bus Terminal. within the Bolgatanga Municipal. The survey aimed to identify causes, assess impacts, and propose mitigation strategies. A total of 200 responses were collected.

Demographic Information

This section analyses the demographic makeup and types of road users who participated in the Bolgatanga Highway Visual Pollution Survey.

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The survey captured responses from a sample size of 200. Most respondents (73%) identify as male, with females comprising the remaining 27%. The largest age group falls within the 26–35-year range (38.5%), followed closely by those under 25 (35%). The 36-45 age group represents 20.5%, followed by a smaller percentage (4%) between 46 and 55 years old. Only a small fraction (2%) is above 55 years old.

The overwhelming majority (71.5%) have a tertiary-level education (college or university). Secondary/vocational/technical education comes in second at 14.5%. Junior high school education is reported to be 11%, with primary school education at 2%. Only 1% reported having no formal education. On the type of road users included in the survey, motorcyclists (26.5%) form the largest group, followed by motor-tricyclists (10.5%) and passengers (22.5%). Pedestrians comprise 17%, with drivers and cyclists at 20% and 3.5%, respectively.

Table 1: A cross-tabulation of the Type of Road user and Age.

		Type of Road User						
		Driver %	**Passenger %**	**Pedestrian %**	**Cyclist %**	**Motor Tricyclist %**	**Motor cyclist %**	**Total %**
Age	**< 25 years**	10	44.4	55.9	14.3	38.1	34	35
	26 - 35 years	35	33.3	35.3	42.9	42.9	45.3	38.5
	36 - 45 years	40	13.3	8.8	42.9	14.3	18.9	20.5
	46 - 55 years	12.5	2.2			4.8	1.9	4
	> 55 years	2.5	6.7					2
Total		**100**	**100**	**100**	**100**	**100**	**100**	**100**

The age group (< 25 years) shows a high representation among passengers and pedestrians, indicating that younger individuals often travel as passengers or walk. Highest representation of Motor Tricyclists in the less than 25 (38.1%) and 26-35 years ranges (42.9%), reflecting the popularity of this mode among younger adults. A similar pattern is seen in the Motorcycle users as 45.3% and 34% represented the 26-35 years range, and the < 25 years respectively possibly due to affordability and convenience.

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A predominant number (40%) of respondents were drivers in the 36-45 age range, suggesting that middle-aged individuals are more likely to drive. Very few, with a slight representation in the 26-35 and 36-45 age ranges, were cyclists.

Causes of Visual Pollution

Frequency of Travels

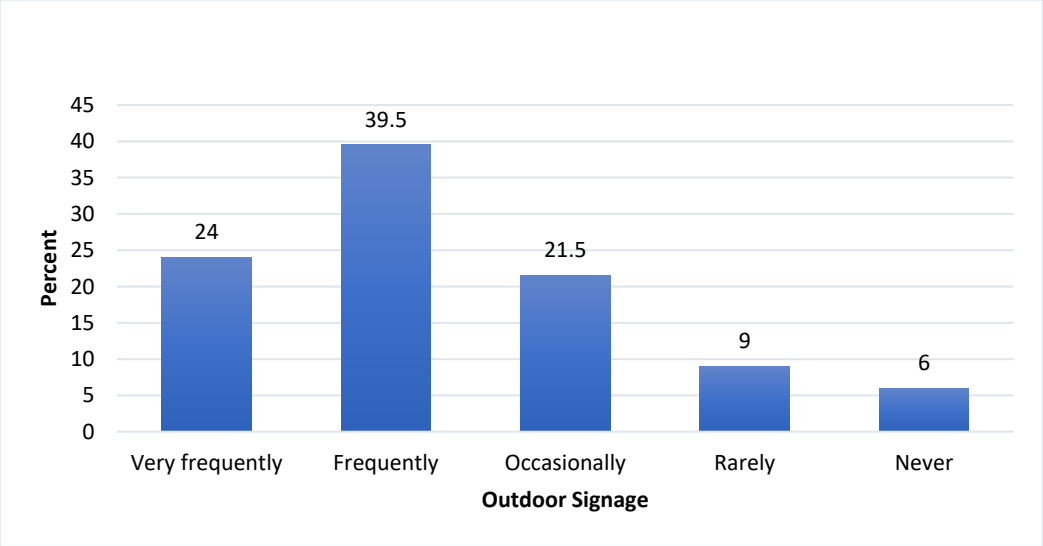

Figure 2: OA / signages frequency

This survey section examines how frequently respondents noticed outdoor signage while travelling on the Bolgatanga highway stretch.

A significant majority of participants (63.5%) reported noticing outdoor signage very frequently (24%) or frequently (39.5%), as indicated in Figure 2. This suggests a high saturation of signage along the highway, making it difficult to miss. A combined 30.5% of respondents noticed signage occasionally (21.5%) or rarely (9%). This indicates that not everyone is constantly bombarded by visual stimuli from these advertisements. A small minority (6%) reported never noticing the signage. This might be due to infrequent travel on the highway or a focus on other aspects of the

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journey. The data suggests that outdoor signage on the Bolgatanga highway is evident to most road users.

Visual Pollutants

Participants on the highway stretch selected for this research reported further exploring the primary visual pollutants. The total percentage (175.5%) exceeds 100% because respondents could select multiple options.

Table 2: Primary visual pollutants

Visual Pollutants	**Responses**	
	Frequency (N)	**Percentage %**
Large billboards with excessive text and graphics	79	39.5
Overhead signs that obstruct the view of the landscape	43	21.5
Roadside banners that are poorly maintained or cluttered	94	47
Excessive advertisements along the roadside	72	36
Excessive directional/Road signs	38	19
None, I do not find any signage visually polluting	32	16
Total	**351**	**175.5**

The most frequently reported pollutants were poorly maintained or cluttered roadside banners (47%), large billboards with excessive text and graphics (39.5%), and excessive advertisements along the roadside (36%). These findings suggest that many respondents perceive overly cluttered and visually busy signage as the primary source of visual pollution. This clutter might include excessive text, graphics, or poorly maintained banners with faded or ripped elements.

A considerable number of respondents (21.5%) identified overhead signs as a visual pollutant, suggesting they might block the view of the landscape and potentially create a sense of visual enclosure. While less concerning than the previous categories, 19% of respondents considered excessive directional or road signs to be visually polluting. This might indicate a need to evaluate the necessity and placement of these signs to ensure clarity without contributing to clutter.

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It is interesting to note that 16% of respondents reported not finding any signage visually polluting. This suggests a potential variation in individual perception of visual clutter.

Locations where OA is particularly visually polluting

The survey responses in the chart below explore locations perceived as particularly visually polluting on the highway stretch. It is important to consider that traffic density likely plays a role in these perceptions, as busier intersections might concentrate more signs.

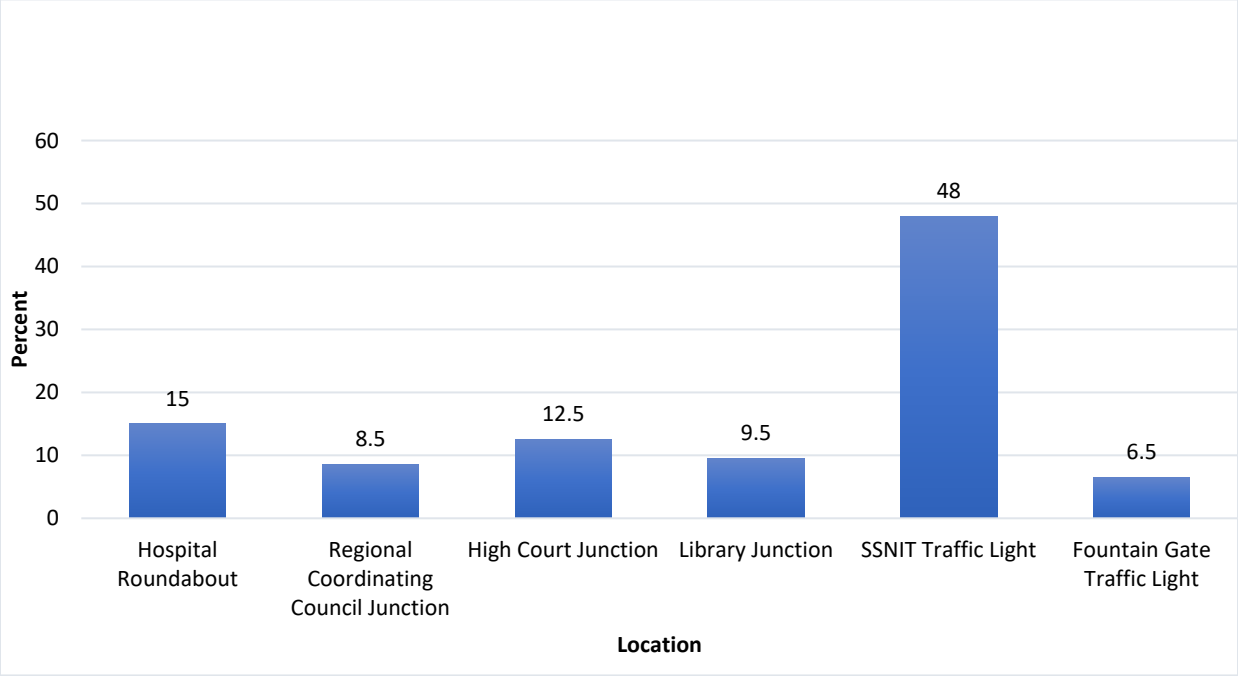

Figure 3: Locations of Signage Concentration

Figure 3 revealed that nearly half of respondents (48%) identified the SSNIT Traffic Light Junction as the most visually polluting location. The SSNIT Traffic Light Junction is a bustling intersection, leading to a greater concentration of signage, advertisements, and other visual elements competing for attention. These findings and the high traffic density likely present at these intersections suggest a potential correlation between heavy traffic flow and the perception of visual pollution. Traffic congestion might heighten awareness of excessive signage, making it appear even more

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overwhelming. A smaller percentage of respondents (6.5%) found the Fountain Gate Traffic Light problematic. This might indicate a less cluttered visual environment at that location.

Based on the survey data, the SSNIT Traffic Light Junction emerged as the location perceived as most visually polluted on the highway segment selected for the study. A visual analysis of the signage and OA concentration at this intersection was conducted to gain further insights. Below is a sample of some of the pictures taken.

Some of the observations from the images reveal a high concentration of signage at the intersection, including billboards, traffic lights, streetlamp banners, and more minor pole signs. The overall impression is of visual clutter, with road signs competing for attention with outdoor advertisements like billboards and banners. Some OAs appear large and visually busy, with bright colours and multiple messages. The traffic light poles also hold multiple posters, further contributing to the cluttered look.

The visual analysis corroborates the survey findings regarding the SSNIT Traffic Light Junction. The sheer number, size, and design of the OAs at this location could create a visually overwhelming experience for road users. This clutter could distract drivers and reduce the effectiveness of the signage and advertisements.

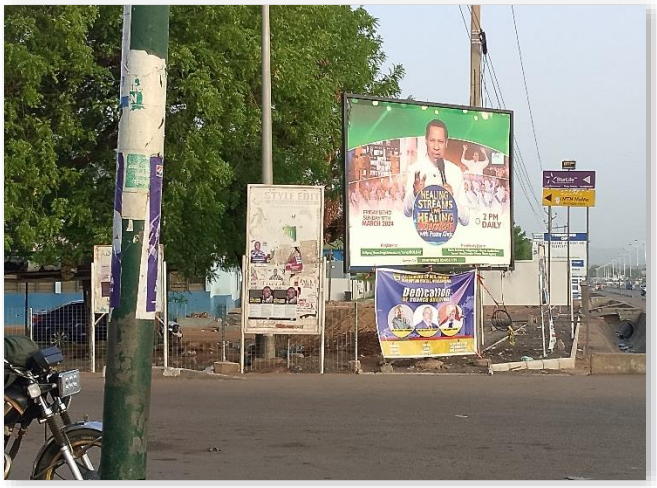

Plate 1: Visual data at SSNIT Traffic Light

Plate 2: Visual data at SSNIT Traffic Light
Source: Fieldwork

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Plate 3: Visual data at SSNIT Traffic Light
Source: Fieldwork

Plate 4: Visual data at SSNIT Traffic Light
Source: Fieldwork

Impact on Road Users

Travelling Experience

The data presented in this section pertains to the impact of OAs and signages on road users who travel along the highway between the Hospital Roundabout and the STC Bus Terminal within the Bolgatanga Municipality.

Table 3 shows a survey response on how outdoor signage affects road users' travel experience. Notably, the total percentage (195.5%) exceeds 100% because respondents could select multiple options.

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Table 3: Travelling Experience

Travelling Experiences	**Responses**	
	Frequency (N)	**Percentage %**
Provide useful information about businesses, services, or attractions	77	38.5
Assist with navigation and wayfinding	79	39.5
Increase awareness of products or events	60	30
Contribute to a visually appealing environment	50	25
Serve as a distraction or nuisance	63	31.5
It does not affect my travel experience	62	31
Total	**391**	**195.5**

The data reveals mixed views on the impact of outdoor signage. While some respondents found it beneficial, others considered it a nuisance. Most respondents (38.5%) valued signage for providing information about businesses, services, or attractions. This indicates that many travellers rely on these signs to identify places of interest and make informed decisions. Similarly, the highest percentage of respondents (39.5%) found outdoor signage helpful for navigation and wayfinding. This highlights the practical role of signage in assisting travellers in locating their destinations and ensuring a smoother travel experience. 25% felt that outdoor signage contributes to a visually appealing environment. This indicates that some signage is aesthetically pleasing and enhances the visual landscape. While not the most substantial positive impact, 30% reported that signage increased awareness of products or events.

However, a concerning percentage of respondents also viewed signage negatively. A notable percentage (31.5%) reported that outdoor signage is a distraction or nuisance. This points to a significant concern about the potential safety risks posed by excessive or poorly placed signage, which can divert drivers' attention from the road. Approximately 31.0% of respondents reported no impact from outdoor signage, which suggests a degree of desensitisation or acceptance among some road users.

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Distraction and Safety Concerns

The survey further examined responses on public perception regarding the impact of outdoor signage on road user distraction and safety along the highway between the Hospital Roundabout and the STC Bus Terminal within the Bolgatanga Municipality.

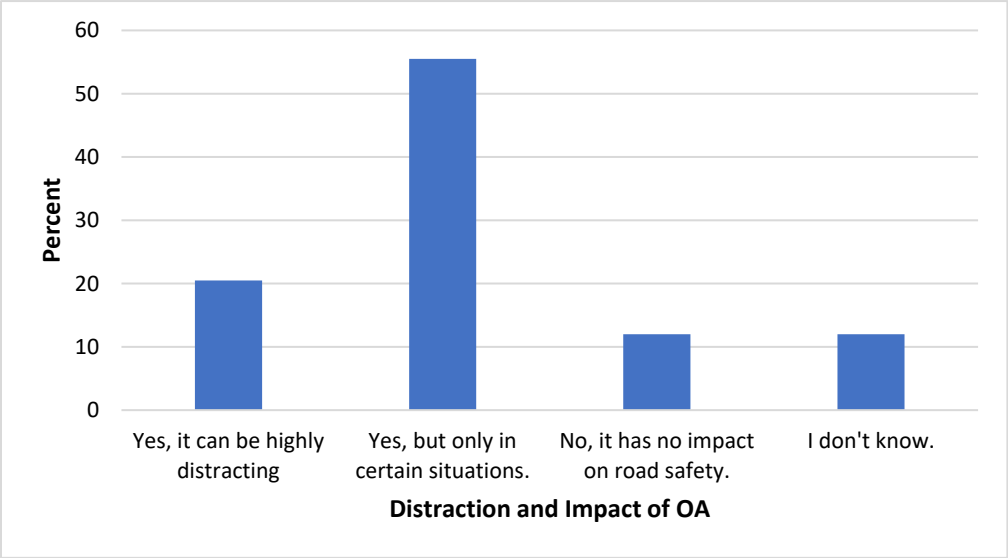

Figure 4: Perception of Distraction by Road Users

20.5% of the respondents believe that outdoor signage can be highly distracting. This indicates a notable concern among road users about the potential safety hazards posed by excessive or poorly positioned signage.

Most respondents (55.5%) acknowledge the situational nature of distraction caused by outdoor signage. This suggests that while signage may not always be problematic, specific circumstances can amplify its distractive effects, such as during heavy traffic, complex intersections, nighttime driving, large billboards, text-heavy messages, flashing lights or when the signage contains hectic visuals.

Only 12% of respondents felt signage has no impact on road safety. This perspective may indicate a high tolerance for visual stimuli or users' confidence in managing distractions while using the route.

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http://www.ajaronline.com
http://doi.org/10.26437/ajar.01.12.2024.11
Special Issue: Applied Research Conference of Technical Universities in Ghana 2024
Received: December 19, 2023
Peer reviewed: June 28, 2024
Revised: December 6, 2024
Published: December 2024

Another 12% were unsure about the impact. The uncertainty expressed by some respondents points to a gap in knowledge or awareness about the risks associated with outdoor signage.

DISCUSSION

This section of the paper discusses the findings of the Bolgatanga Highway Visual Pollution Survey, organised around the three main research objectives: Identifying the causes of visual pollution, assessing the impacts of outdoor advertising (OAs) and signage on road users, and proposing targeted mitigation strategies.

Causes of Visual Pollution in Bolgatanga

The survey reveals that visual pollution along the highway between the Bolgatanga Regional Hospital Intersection and the STC Bus Terminal is primarily caused by outdoor advertisements and signage. Respondents identified various visual pollutants contributing to the highway's cluttered appearance.

Studies by Sunday and Bassey (2021) indicate that excessive clustering of advertising media can overwhelm public spaces, causing information overload and disorientation. This aligns with the survey results, where 47% of respondents identified poorly maintained or cluttered banners as a primary visual pollutant. The overwhelming number of advertisements reduces their effectiveness, contributing to visual clutter that detracts from the environment and diminishes the communicative power of the ads (Sunday & Bassey, 2021).

Moreover, billboards and posters can cause visual distortion, especially when their size, shape, colour, and placement clash with the existing streetscape (Sunday & Bassey, 2021). Large billboards with excessive text and graphics, identified by 39.5% of respondents, further substantiate this issue, indicating that poor design and improper placement contribute to the visually overwhelming environment in Bolgatanga.

Overhead signs also contribute to visual pollution, with 21.5% of respondents expressing concerns about how they obstruct scenic views and create a sense of visual enclosure. These signs, often placed at busy intersections like the SSNIT Traffic Light Junction, were perceived by 48% of respondents as significant contributors to visual pollution in high-traffic areas. This observation is consistent with studies suggesting that the proliferation of outdoor advertising can destroy the

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sense of place by overwhelming a location's unique characteristics with generic messages (Sunday & Bassey, 2021).

Furthermore, the negative impact of outdoor advertising on traffic flow and safety is well-documented, as billboards and signage can distract drivers and obstruct vital traffic signs (Okosun & Jiburum, 2015; Sunday & Bassey, 2021). This is a pertinent issue for the Bolgatanga highway, where poorly placed and cluttered signage at critical traffic points could create potential hazards for road users. Studies have also shown that digital billboards, which frequently change, pose a particular risk by further distracting drivers and complicating the visual environment. (Belyusar et al., 2016; Stavrinos et al., 2016).

Lastly, poorly maintained billboards and signs contribute to visual pollution and urban decay. This is reflected in the survey respondents' perception of clutter, who pointed to poorly maintained banners and large billboards with excessive text. The lack of maintenance of such advertisements can contribute to an untidy and unsafe environment, devaluing the visual quality of the streetscape and impacting property values (Sunday & Bassey, 2021).

Impacts of Outdoor Advertising (OAs) and Signage on Road Users

OAs, particularly near roads, can significantly impact user behaviour and safety. While the advertising industry views roadsides as valuable locations for capturing attention and promoting products, this placement raises concerns regarding potential distractions and safety risks for drivers, pedestrians, and other road users.

OAs, especially those with bright colours, dynamic displays, or large sizes, can contribute to visual clutter in the driving environment. This clutter competes for drivers' attention, making it more difficult for them to focus on essential driving tasks and information, such as traffic signs, signals, and potential hazards. (Azeema & Nazuk, 2016; Edquist et al., 2011; Holahan et al., 1978; Oviedo-Trespalacios et al., 2019; Sunday & Bassey, 2021)

The presence of numerous OAs, especially in dense urban areas, can lead to information overload for drivers. Processing multiple advertising messages, in addition to attending to the driving task, increases cognitive load, potentially impairing drivers' ability to react promptly to changing road conditions (Azeema & Nazuk, 2016; Oviedo-Trespalacios et al., 2019)

Poorly placed OAs can obstruct drivers' views of vital traffic signs and signals, increasing the risk of confusion and errors in decision-making (Sunday & Bassey, 2021)

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Crashes near OAs often involve fixed objects, sideswipes, and rear-end collisions. These types of crashes are consistent with drivers being visually distracted and failing to maintain adequate control of their vehicles (Islam, 2015; Sisiopiku et al., 2015)

Many researchers primarily focus on the impacts of OAs on drivers. However, considering the potential risks to other road users, such as pedestrians and cyclists, is essential. OAs can obstruct their views of traffic, distract their attention, and create safety hazards, particularly in areas with high pedestrian activity (Azeema & Nazuk, 2016; Megías et al., 2011; Useche et al., 2018)

Positive Impacts of OAs and Signage

The survey results show that 38.5% of respondents appreciate outdoor signage for providing valuable information about businesses, services, or attractions, while 39.5% value its role in aiding navigation and wayfinding. This underscores the practical utility of OAs in enhancing the travel experience, helping road users make informed decisions and find destinations easily. This aligns with Edquist et al. (2011), who highlight that well-designed and strategically placed signage can be an essential navigational tool for drivers, contributing positively to road safety by providing clear information without causing distraction.

Additionally, Azeema and Nazuk (2016) and Sunday and Bassey (2021) discuss how aesthetically appealing signage, particularly those that are well-designed and thoughtfully integrated into the urban environment, can improve the visual quality of the highway, which is reflected in the 25% of respondents who felt that signage contributes to a visually pleasing environment. These findings suggest that OAs, when placed and designed appropriately, can positively influence the aesthetic experience of road users, creating an enhanced visual environment that benefits the municipality.

Negative Impacts of OAs and Signage

Despite the positive feedback on the utility of signage, 31.5% of respondents reported that outdoor signage serves as a distraction or nuisance, with 20.5% identifying it as highly distracting. This concern echoes the work of Azeema and Nazuk (2016) and Oviedo-Trespalacios et al. (2019), who found that OAs, especially those with bright colours, dynamic displays, or large sizes, contribute to visual clutter that competes for drivers' attention, making it difficult for them to focus on essential driving tasks. This clutter, particularly in high-traffic areas like the SSNIT Traffic Light, forces drivers to divide their attention between advertisements and critical road elements such as traffic signs and potential hazards, increasing cognitive load and the risk of accidents.

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The situational nature of distraction, as noted by 55.5% of survey respondents, can be explained by research from Oviedo-Trespalacios et al. (2019), which highlights how traffic density, road complexity, and the nature of the signage can intensify the level of distraction. Large billboards with text-heavy messages, flashing lights, and overly busy visuals are particularly problematic during heavy traffic or nighttime driving, when drivers are more susceptible to information overload. This finding parallels Holahan et al. (1978) and Edquist et al. (2011), who suggest that cognitive overload from processing multiple advertising messages while attending to driving tasks can impair drivers' ability to react promptly to changing road conditions.

Safety Concerns Related to Poorly Placed OAs

Drivers, particularly those in the 36-45 age group (representing 40% of respondents) face the risk posed by poorly placed OAs, which can obstruct views of essential traffic signs or signals, increasing the risk of confusion and errors in decision-making. This concern is echoed by Sunday and Bassey (2021), who note that such signage can create dangerous blind spots for drivers, leading to poor decision-making and reduced reaction times. Furthermore, research by Islam (2015) and Sisiopiku et al. (2015) reveals that crashes near OAs often involve fixed objects, side-swipes, or rear-end collisions, all of which are consistent with drivers being visually distracted and failing to maintain control of their vehicles.

Impact on Non-Drivers

While many studies focus on the impact of OAs on drivers, it is equally important to consider the risks posed to pedestrians and cyclists, as noted by Azeema and Nazuk (2016) and Useche et al. (2018). The data also shows that motorcyclists (26.5%) and motor-tricyclists (10.5%) make up a substantial portion of road users, with the highest representation in the 26-35 years and under 25 age groups. Motorcyclists and cyclists are vulnerable to visual distractions, as they rely more on peripheral vision to navigate the road and maintain balance. Poorly placed or overly distracting advertisements can obstruct the views of non-drivers, potentially leading to dangerous situations where pedestrians or cyclists cannot see oncoming traffic or are distracted by large, visually stimulating signage.

In areas with high pedestrian activity, younger individuals, many of whom travel by foot or as passengers, may be disproportionately affected by OAs. This presents a serious safety concern,

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particularly in areas with high pedestrian activity, such as the highway between the Bolgatanga Regional Hospital Intersection and the STC Bus Terminal.

CONCLUSION

This research provides a comprehensive understanding of visual pollution on the Bolgatanga highway, focusing on outdoor advertising (OA) and signage. The study reveals that visual pollution on the Bolgatanga highway is primarily caused by outdoor advertising (OA) and signage. Cluttered and poorly maintained billboards, banners, and excessive signage contribute significantly to this problem.

The study identifies the SSNIT Traffic Light Junction as a particularly visually polluted area due to the high concentration of signage and heavy traffic. These findings highlight the need for stricter regulations and improved design practices to address visual pollution and create a safer, more visually appealing highway environment.

Mitigation Strategies and Recommendations

The findings from this study offer several practical recommendations and policy implications to mitigate the negative impacts of OAs on road users:

- *Regulation and Control of OAs:* Comprehensive regulations and guidelines are crucial for managing the placement, size, illumination, and content of OAs to minimise visual clutter and distraction. This includes limiting the density of billboards, prohibiting digital billboards in high-risk areas, and setting standards for brightness and luminance levels. Where regulations exist, implement them and strengthen enforcement to ensure compliance.
- *Location Restrictions:* Restricting the location of OAs, such as prohibiting them near intersections, complex driving locations, and areas with high pedestrian activity, can help reduce distraction and improve safety for all road users.
- *Content Considerations:* Regulating the content of OAs to prohibit or limit distracting or provocative imagery, as well as the number of words and complexity of messages, can help reduce cognitive load and improve drivers' ability to process information.
- *Design and Aesthetics:* Encouraging well-designed OAs that complement the surrounding environment and minimise visual clutter can enhance the aesthetic quality of the streetscape. Stakeholders in the advertising industry, including graphic design professionals, should

ISSN: 2408-7920

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develop guidelines for visually appealing and less distracting signage. Advertisers could further explore the potential of digital signage to reduce visual clutter and provide targeted information.

- *Prioritizing Safety and Community Needs:* Balancing the interests of the advertising industry with the safety and well-being of road users and the community is essential.
- *Public Awareness:* Conduct campaigns to educate road users about the adverse effects of visual pollution and encourage responsible signage practices.

There is a need for ongoing research and monitoring to evaluate the impacts of evolving OA technology and inform policy decisions to ensure the safety and aesthetic quality of the road environment for all users. Further research can provide a deeper understanding of the long-term consequences of visual pollution and inform future policy decisions.

By implementing these recommendations, the Bolgatanga Municipality can potentially create a more visually appealing and safer highway environment for all road users.

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