

Original Article

The Impact of Communication Design on Environmental Pollution

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Abstract - The accumulation of solid, liquid, and gaseous wastes has become a serious environmental menace through indiscriminate disposal, uncontrollable combustion, and the release of exhaust fumes. This research studies the impact of visual communication strategies on ecological pollution levels, examining both the causes and consequences of this phenomenon. The study focuses on improperly discarded materials that create dangerous living conditions and degrade the local ecosystem. While multiple elements contribute to environmental degradation, this investigation specifically analyses the importance of communication design in Oyo State, Nigeria. The study employed quantitative survey methods, collecting data from 200 residents in Ogbomoso through structured questionnaires. Researchers analysed responses using cumulative percentage calculations to identify key patterns and trends. Findings reveal the paradoxical nature of communication design. While contributing to pollution through excessive paper waste (accounting for 30% of total waste), it simultaneously offers solutions through awareness campaigns. A significant knowledge gap exists regarding proper waste disposal methods among residents, exacerbating pollution problems. The research concludes that targeted communication campaigns could noticeably improve waste management practices. Specifically, the study recommends expanding educational initiatives that demonstrate proper disposal techniques through visual media. These findings highlight the critical need for strategic communication interventions to address environmental hazards while minimising the design's ecological footprint. The dual findings underscore both the problem and potential solution inherent in communication design applications.

Keywords - Communication, Campaign, Environment, Ogbomoso, Pollution.

1. Introduction

Environmental pollution refers to the introduction of harmful solid, liquid, or gaseous substances often categorised as scrap, refuse, or waste, into the Environment, rendering it unsafe and unsustainable [1]. Waste is broadly classified into solid and hazardous types, including municipal, industrial, medical, and radioactive waste. With rapid population growth and increased consumption, waste generation has become an inevitable consequence of these trends. However, poor waste management practices in Oyo State, Nigeria, have exacerbated environmental degradation, creating unhealthy living conditions. A pilot study revealed that residents of Ogbomoso persistently dispose of waste in unauthorised areas, breaching ecological regulations meant to curb such practices. This negligence and the continuous ignorance of the practice have led to laws that, despite their existence, remain weak in enforcement and public compliance due to insufficient awareness and engagement strategies. Despite legislative measures, improper waste disposal persists, posing a risk to public health and ecosystems [2]. This underlines the urgent need for innovative communication design, a blend of visuals (symbols, images), text, and actions, to educate and motivate behavioural change. Effective design can bridge this gap by translating complex environmental messages into accessible, actionable formats. By leveraging design as a



tool for advocacy, stakeholders can foster a culture of sustainability, ensuring that policies are not just enacted but embraced by communities. Addressing this challenge is vital to the transformation of Oyo State into a cleaner and healthier habitat.

2. Literature Review

Various challenges have affected waste management in urban centres, making it inadequate to handle waste management responsibilities. Waste often piles up in heaps before being cleared, and sometimes, refuse drums or barrels are overfilled, causing spills that pollute the land and air before the waste is finally removed. This uncontrolled accumulation leads to environmental harm due to improper storage and delayed disposal.

Omolawal and Shittu [3] concentrate on the challenges affecting the management of solid waste in the Ibadan North Local Government area of Oyo State, Nigeria, as it reveals some challenges that face waste management, which include financial incapacity, negative attitude, and unplanned city structures, among other factors that affect solid waste management and environmental sanitation. Alaka and Osman [4] delve into the root causes and inherent challenges in the disposal of municipal solid waste in Oyo State, Nigeria. The study employed a multifaceted methodology involving on-site observations of notable dumpsites, stakeholder interviews, household interviews, and an extensive literature review, and the result revealed the need to properly pronounce the need of public awareness on the campaign of environmental waste management.

Sustainability has played a vigorous role in protecting and enhancing our Environment. It guides responsible production, design, and daily living by promoting mindful resource use. This practice prevents depletion, ensuring natural assets remain available for future generations. Adopting sustainable methods promotes a healthier environment that can thrive without facing ecological crises. Michael [5] specified that sustainability is the dynamic equilibrium in the interaction between a population and its Environment without compromising each other. Environmental sustainability is multi-faceted, and the disposal of waste is a major aspect of environmental sustainability [6]. The awareness about environmental sustainability has helped people understand the Earth's ecological decline. Various environmental elements interact to maintain ecological balance, fostering sustainability while minimising harm to all life forms- humans, wildlife, plants, and ecosystems. By adopting green practices, society can shift toward sustainable living. These eco-conscious habits reduce environmental damage and preserve natural resources for future generations. Sustainable approaches in daily life, industry, and policy-making contribute to long-term planetary health, ensuring a thriving environment for all living beings. Environmental sustainability must remain a priority, given the increasing damage caused by human activities [7].

Effective communication, particularly visual design, plays a crucial role in promoting sustainability. Visual communication generates new insights, applies knowledge, and uses informed intuition to make abstract environmental issues tangible and understandable for the public [8]. To address ecological challenges, communication strategies must evolve in tandem with environmental changes. This involves leveraging visuals to raise awareness, inspire action, and simplify complex sustainability concepts. By adapting these techniques, society can better grasp environmental concerns and adopt more sustainable practices, ensuring long-term ecological balance. The Environment is saturated with graphic design elements, which vary from street signs and advertising posters to product packaging and digital interfaces. Visual communications serve multiple purposes in human development as they inform, persuade, decorate, and often provoke emotional or behavioural responses, as they hold particular significance for environmental sustainability. Effective environmental communication design might promote waste reduction, encourage responsible consumption patterns, or build support for green policies. Conversely, poorly conceived design can inadvertently endorse unsustainable practices or fail to adequately educate the public about ecological issues. Communication design synthesises various creative focus fields, including typography, illustration, photography, and print technology [9, 10]. It

functions as a problem-solving tool that conveys messages through visual language by employing symbols, colour systems, forms, and compositional strategies. The scope of contemporary communication design extends beyond mere aesthetic creation; it has become instrumental in facilitating societal transformation. This transformative potential is particularly relevant for aligning collective behaviours with sustainability principles. Uka and Anyaele's [11] research examines this dynamic in the Nigerian context, specifically investigating how communication design can address visual pollution. Their work highlights the harmful impacts of visual clutter on both human well-being and environmental health.

Oladumiye, Ogunlade, and Kayode [12] also explore the global trends in environmental monitoring and preserving the Environment based on various techniques. It was observed that the posting of graphical bills has been one of the greatest threats to pollution in the Environment, ranging from the distribution of handbills, bulletins, and posters. However, the researcher in his paper discusses the trends of posting graphic advertisement bills, as it's a major pollution problem, mainly in the urban developed areas. The findings emphasise the importance of strict control and market regulations in the posting of advertisement bills and in eradicating pollution in the Environment. Although Ario [13] adopted the effectiveness of pamphlet design in raising environmental awareness, with survey results from 256 respondents showing improved waste disposal habits after exposure to the designed materials. The use of visual composition to solve problems and communicate messages to the public through the use of visual compositions [14]. Environmental graphic design represents a specialised application that employs murals, transit signage, and public installations to convey ecological messages while enhancing user experience [15]. Such designs serve dual purposes: they connect people to their surroundings while promoting community safety through clear visual communication [16].

Ekong [17], in his comparative study on the environmental impact of outdoor advertising in Nigeria, analyses the positive and negative role of outdoor advertising on the use of posters, billboards and other signage in communicating to the commuters and society, as it creates environmental visual noise and easily destroys the aesthetic of the Environment. The research examines the negative and positive impacts of outdoor advertising on the Environment, and it tends to mitigate the negative impact. Bassey and Eteng [18] buttress this claim in their study on the impact of outdoor advertising on posters and billboards in the Nigerian urban Environment, as it provides an avenue for marketing goods and services.

To create impactful design communication, designers must have a deep understanding of human psychology, including behaviour, attitudes, motivations, and aspirations, to craft messages that resonate effectively [19]. Perception and cognitive processing are equally vital, as they determine how individuals interpret visual information [20]. The goal of visually driven design is not just to inform but to shape user perspectives and inspire action. Beyond aesthetics, design serves as a lens for analysing and engaging with the social world through the medium of communication [21]. Effective communication design influences compelling visuals that translate complex environmental issues into accessible, persuasive messages, empowering community-driven sustainability efforts [22]. Graphic designers and other communication specialists act as vital intermediaries, bridging the gap between audiences and ecological concerns by embedding persuasive narratives into products, advertisements, and multimedia campaigns [23]. By merging psychological insight with creative strategy, designers can foster awareness, shift public attitudes, and drive meaningful environmental action. Ultimately, their work transforms abstract challenges into tangible solutions, making sustainability both visible and actionable for broader audiences. The need for change is that graphic designers have the potential to influence members of society through persuasive visual communication, in which they produce services and ideas that have a direct impact on both human society and the Environment in which they exist. Graphic designers create appealing messages on products and other visual elements, which serve as an intermediary between the clients and the Environment to create a positive solution to the Earth's problems [23].

3. Methodology

The research was carried out using a survey design to find out the impact of communication design on environmental pollution among the Ogbomoso residents in Oyo State, Nigeria. A total of 200 questionnaires were issued, and 150 of the questionnaires were returned and analysed statistically using the Statistical Package for Social Sciences (SPSS).

4. Discussion and Findings

Table 1. Sex of respondents

Sex	Frequency	Percentage	Valid Percentage	Cumulative Percentage
Male	63	42	42	42
Female	87	58	58	100
Total	150	100	100	

Source: Data collected and analysed by researcher (2025)

Table 1 presents respondent demographics, with females comprising 58% constituting 87 responses, while 42%, constituting 42% were male respondents.

Table 2. Age of respondents

Age	Frequency	Percentage	Valid Percentage	Cumulative Percentage
18-28	43	28.7	28.7	28.7
29-39	55	36.7	36.7	65.4
40-49	34	22.7	22.7	88.1
50-59	12	8.0	8.0	96.1
60 and above	6	4.0	4.0	100
Total	150	100	100	

Source: Data collected and analysed by researcher (2025).

Table 2 shows that 36.7% of the respondents for this research were aged between 29 and 39 years, constituting the majority of the respondents. This was followed by the respondents in the range of 18-28 years with 28.7%, those between 40-49 years constitute 22.7% and the age range of 50-59 years is 8% while those in the age range of 60 years and above made up 4% of the total number in the distribution.



Fig. 1 Generated wastes in LAUTECH, Ogbomoso

Source: Research fieldwork (2025)



Fig. 2 Generated wastes in Yoaco, Ogbomoso

Source: Research fieldwork (2025)

Table 3. What type of waste do you generate?

Waste	Frequency	Percentage
Food	25	16.7
Paper	45	30
Fabric	30	20
Wood	20	13.3
Others	30	20
Total	150	100

Source: Data collected and analysed by the researcher (2025)

Table 3 presents the waste composition data collected from respondents' residential and work environments. The survey reveals paper waste constitutes 30% of total waste, including pharmaceutical packaging, grocery bags, and workshop paper scraps. Fabric and miscellaneous household waste account for 20% of the total waste generation. Food waste represents 16.7% of the total, primarily originating from food service establishments, while wood waste makes up 13.3%. The study documents diverse waste disposal patterns across different communities, with visual evidence presented in Figures 1 and 2. Common waste categories identified include paper products, plastic films, textile materials, hair clippings, and various domestic discards. These findings demonstrate the heterogeneous nature of waste streams in urban environments, highlighting the need for differentiated waste management strategies to address the specific composition of residential and commercial waste generation patterns.



Fig. 3 Drum disposal, Ogbomoso

Source: Research fieldwork (2025)



Fig. 4 Drainage and Gullies, Ogbomoso

Source: Research fieldwork (2025)

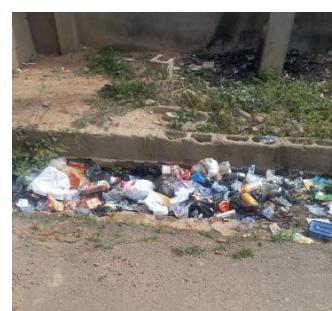


Fig. 5 Refuse Burning, Ogbomoso

Source: Research fieldwork (2025)

Table 4. How do you dispose of your waste?

Item	Frequency	Percentage
Burning	35	23.3
Dumpsite	50	33.3
Water channels	10	6.7
Waste Management Agency	30	20
Roadside Dumping	10	6.7
Drainage and gullies	15	10
Total	150	100

Source: Data collected and analysed by researcher (2025)

Table 4 details the waste disposal practices among respondents, categorised according to the waste types identified in Table 3. The predominant approach is landfill disposal, utilised by 33.3% of participants who utilise designated dumping areas. Incineration serves as the primary method for 23.3% of the population, while municipal waste services manage refuse collection for approximately 20%. A concerning 10% of waste is disposed of in water channels and ravines. The least common practices involve discarding refuse in waterways or along

thoroughfares, accounting for 6.7% of cases. Visual representations of these methods appear in Figures 1 through 5. Landfill sites remain the preferred choice primarily due to their convenience and economic viability, with proximity to undeveloped land and abandoned structures further influencing this preference. Unlike fee-based disposal alternatives (illustrated in Figure 3), these unofficial dump sites offer an immediate, no-cost waste solution.

Table 5. Do you raise awareness of the impact of the inappropriate disposal of waste on the environment?

Item	Frequency	Percentage
Yes	130	86.7
No	20	13.3
Total	150	100

Source: Data collected and analysed by researcher (2025)

Table 5 reveals public awareness regarding improper waste disposal and its environmental impacts. The data shows that 86.7% of respondents demonstrated an understanding of how waste pollution endangers ecosystems and human health. However, 13.3% remain unaware of these harmful consequences. This disparity highlights varying levels of environmental consciousness among the population regarding waste management practices and their ecological effects.



Fig. 6 Billboard as a means of awareness

Source: Research fieldwork (2025)



Fig. 7 Billboard as a means of awareness

Source: Research fieldwork (2025)

Table 6. In what medium has awareness of the inappropriate disposal of waste been communicated?

Item	Frequency	Percentage
Television	12	8.0
Radio	20	13.3
Billboard	35	23.3
Book Prints	15	10.0
Posters and Fliers	25	16.7
NGO Advocacy	5	3.3
Government Advocacy	8	5.3
Social Media Adverts	30	20.0
Total	150	100

Source: Data collected and analysed by the researcher (2025)

Table 6 presents the various communication channels through which respondents received information about improper waste disposal practices. The data reveal that billboard installations at strategic locations served as the primary awareness medium for 23.3% of participants. Social media advertisements reached 20% of respondents, while designed posters and fliers effectively communicated the message to 16.7% of the population. Traditional media channels showed varying effectiveness, with radio broadcasts informing 13% of respondents, printed materials (books and pamphlets) reaching 10%, and motion advertisements (such as television or digital videos) educating 8%.

The remaining respondents gained awareness through organised advocacy programs, with 5.3% informed by government initiatives and 3.3% by non-governmental campaigns. These findings demonstrate the diverse media landscape used for environmental education about waste management. Figures 6 and 7 provide visual documentation of these communication methods, particularly showcasing billboard implementations as a prominent awareness tool. The distribution highlights the continued importance of both physical and digital media in disseminating environmental messages to different demographic groups within the community.

Table 7. What medium of awareness creation on environmental pollution do you prefer?

Item	Frequency	Percentage
Illustrated Books	28	18.7
Poster and Fliers	49	32.7
Billboard	20	13.3
Social Media	28	18.7
Video Clips	25	16.7
Total	150	100

Source: Data collected and analysed by researcher (2025)

Table 7 illustrates the medium through which communication design creates awareness of environmental pollution among the respondents. 32.7% of them prefer the usage of posters and fliers, then 18.7% prefer the use of illustrated books, and the pop-up adverts on various social media handles as a means of creating awareness, followed by 16.7% prefer the creation of awareness through different video clips, which might be a short animated video or motion pictures and 13.3% prefer billboard as means of awareness creation on environmental pollution.

Environmental pollution, comprising solid, liquid, and gaseous waste, remains a critical challenge in urban areas like Oyo State, Nigeria, where population growth exacerbates waste generation. Studies by Omolawal and Shittu [3] and Alaka and Osman [4] highlight systemic issues such as financial constraints, unplanned urbanisation, and poor public awareness, leading to inefficient disposal methods like open dumping (33.3%) and burning (23.3%). Sustainability, as emphasised by Michael [5], requires balancing resource use and environmental health, with communication design playing a pivotal role in fostering behavioural change. Visual tools—billboards (23.3%), social media (20%), and posters (16.7%) effectively raise awareness, as demonstrated by Ario [13], who linked pamphlet campaigns to improved waste disposal habits.

This study surveyed 150 Ogbomoso residents (58% female, 36.7% aged 29–39) to evaluate waste practices and communication efficacy. Findings revealed paper waste (30%) as the most generated, while 86.7% acknowledged awareness of improper disposal impacts, primarily through billboards and social media. Despite this, 13.3% remained uninformed, underscoring gaps in outreach. Respondents favoured posters and handbills (32.7%) and illustrated books (18.7%) for environmental messaging, highlighting the need for tailored and visually engaging content.

5. Summary and Conclusion

The research underscores the dual role of design: while outdoor ads contribute to visual pollution, strategic communication can mitigate harm by promoting sustainability. Effective design, rooted in human psychology, must translate complex environmental issues into actionable public messages. Recommendations include stricter regulation of ad placements, enhanced community-led initiatives, and leveraging preferred media (e.g., video clips, 16.7%) to bridge awareness gaps. By aligning design strategies with local preferences and systemic improvements, Ogbomoso can advance waste management and reduce pollution, serving as a model for similar urban centres.

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