International Journal of Advances in Engineering and Management (IJAEM)
Volume 7, Issue 11 Nov. 2025, pp: 179-184 www.ijaem.net ISSN: 2395-5252

Assessment of Community Perceptions of Transport- Related Environmental Impacts: A case Study of Samara- Logia twin town, Ethiopia.

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Date of Submission: 05-11-2025 Date of Acceptance: 15-11-2025

ABSTRACT

The quick expansion of city road traffic and the pollution it causes pose a high challenge to sustainable growth in key freight route towns of poor nations. This study examined at how road traffic affects commuters by checking what locals think in Samara-Logia City, Ethiopia—an important centre without regular pollution checking tools.

A mix of methods were used in this study. The research examined 396 survey answers. Number crunching aimed to see how personal factors shape traffic-related worries through basic stats special tests, and a complex math model across five areas, including Clean Transport measures and Perceived Health Dangers.

The main results show commuters are still very worried about pollution from transportation. Looking at the themes, we found car exhaust (48.7%) and loud noises (32.6%) are the biggest transport problems. When we checked who's most at risk, we saw workers by the road (32.8%) and older folks (24.0%) are in the most danger from these issues. The community thinks the best ways to fix this are to crack down on vehicle emissions (19.4%) and make public transport better (18.9%).

KEY WORDS: Urban Road Transport, Environmental Pollution, Community Perceptions, Vehicular Air Pollution, Noise Pollution.

I. INTRODUCTION

In Ethiopia, the transport sector continues to contribute notably to national greenhouse gas (GHG) emissions. According to Ethiopia's Nationally Determined Contributions (NDC), road transport accounts for over 70% of sectoral emissions, and under a business-as-usual scenario, total transport emissions are projected to rise to 41 Mt CO_2 by 2030. This increase is driven by unprecedented motorization, infrastructure expansion, and limited modal shift toward low-carbon alternatives. The NDC outlines mitigation strategies including electrification of transport, expansion of public transit, and fuel efficiency improvements to curb this trajectory.

To grasp how transportation works and affects the environment, we need to see at the ideas and research that shape today's talks. Environmental Justice Theory suggests a way to look at how environmental pros and cons are shared (Bullard, 2000). Risk Perception Theory explores how commuters see and react to environmental dangers (Slovic, 1987). Participatory Planning ideas stress how important it is for citizens to help shape city policies (United Nations Human Settlements Programme [UN-Habitat], 2020). Studies in Ethiopia have shown ongoing problems with systems and society: Tazzie et al. (2025) found that split-up planning and little public input were big roadblocks to putting sustainable transport into action in Addis Ababa. Research in Bahir Dar and Hawassa found that commuters value green spaces—like trees and city parks—to clean the air and boost wildlife (Gashu et al, 2019). In Logia Town, locals showed they knew a lot about how waste practices affect society, money, the environment, and health (Asfaw et al. 2024). These findings match what the United Nations Environment Programme (UNEP, 2024) says. They call for transport plans that don't use motors to cut down on pollution and make things fairer across African cities.

II. LITERATURE REVIEW

Commuters understand environmental risks through what they sense and the social interactions they experience, which affects how much they back changes and adjust their behaviour. The main ideas behind risk perception reveal it is more than just weighing chances and amounts. It also depends on things like how much control commuters feel they have, whether actions are voluntary, fairness, and trust in authorities. Adams and Sherar (2018) showed that community-driven projects like clean-ups and fixing infrastructure spurred by concerns over safety and cleanliness made neighbourhoods better. These efforts got more commuters using the streets and brought neighbours closer together even though the benefits like walking more often for transportation took longer to show. Anciles et. al. (2016) used focus groups and a stated-preference survey to find noise, vibration, and extra travel time as the top local issues. They founded how factors like location, gender, and household makeup shape what communities care about most. They also ranked night-time heavy-vehicle restrictions, parking rules, and safety for pedestrians and cyclists as key areas. Rößler et.al. examined how commuters viewed risks related to fossil fuels e-fuels, and electric vehicles. They found that e-fuels had the least overall perceived risk followed by electric vehicles, with fossil fuels being seen as the riskiest. The study showed that commuters relied heavily on logical reasoning than emotions when making the judgments. It identified that liking cars and concerns about climate change influenced how commuters were ready to shift to fuels or electric vehicles, but in opposite ways. This research highlighted the importance of considering public risk perceptions, which come from both facts and personal experiences. Governments need to include these views in transport and environmental policies to create solutions that commuters will support.

The studies by J. R. Juremalani and his team seen through the perspective of boosting mobility and recycling materials for the sole purpose of cutting down pollution, created a unified body of research. This research aims to make transportation systems productive, eco-friendly, and conscious in areas with mixed traffic. Work on figuring out Passenger Car Unit (PCU) values and saturation flow at intersections with traffic lights (Mahidadiya & Juremalani 2016; Mushtaq et al. 2017) played a key role in fine-tuning traffic signal timing. Studies that compare different models for choosing travel modes (Juremalani & Chauhan 2017; Javeed et al. 2019) and look at the use of Non-Motorized Vehicles (NMVs) (Juremalani & Chauhan, 2017) try to grasp and push for shifts away from private cars. The study on using Construction and Demolition Waste in the DBM Layer of Flexible Pavement (Biswal et al., 2021) applied the idea of recycling materials. Research on replacing stone sand with natural sand in concrete (Bhavsar et al. 2021) showed an effort to cut down on the use of scarce or sensitive resources. The main takeaway is that smart engineering solutions (PCU values, waste reuse) lead straight to good social and environmental results (less pollution safer streets, resource saving).

III. OBJECTIVES

I General Objective

The general objective of this research is to evaluate the human dimension of transportation's environmental impact by checking community perceptions in Samara-Logia City, Ethiopia, to suggest the development of sustainable, evidence-based road and transportation policies and mitigation methods for a major freight corridor hub.

II. Specific Objectives

The specific objectives of this research are:

To quantify the transport-related environmental pollution matters and associated public health risks recognized by the community in Samara-Logia City.

To evaluate the socio-demographic factors that significantly predict a resident's environmental consciousness and involvement in transport planning, using robust regression models.

To create actionable community profiles based to environmental risks, thereby distinguishing groups that require targeted road network planning and transportation demand management (TDM) interventions.

IV. METHODOLOGY

The study used a mix of methods in a cross-sectional design to understand how commuters in Samara-Logia City Ethiopia view the environmental effects of transportation. Researchers preferred using mixed methods to gather broad quantitative data through structured surveys and deep qualitative insights through interviews with key informants. It seems like you've provided placeholder text requesting a rewrite, but there's no actual content to rephrase. Could you please share the original text you'd like me to work on? Then I'll be able to apply the guidelines. The decision to use a mixed-methods design comes from the pragmatic paradigm. This approach relies on the best tools to tackle complicated social issues. Researchers used a convergent parallel strategy. They gathered both numbers-based and descriptive data at the same time. Later, they combined the results during analysis to create an overall understanding of how the community perceives certain issues.

Researchers crafted a detailed questionnaire by referencing studies on topics like air and noise pollution, traffic congestion, and transportation without engines like bikes or walking. The questions touched on topics such as commuters's background information, their travel habits, exposure to risks, thoughts on the environment and health dangers, views on non-motorized transport, and interest in policies. To match the local culture, they translated the survey into Amharic. Table 1 shares details about the socioeconomic makeup of the commuters in Samara-Logia City.

V. RESLUTS AND DISCUSSION

The table 1 insights into the population's socioeconomic composition in Samara-Logia City.

Most of the commuters who responded were men, while women made up merely 34.6%. This points to men being more involved in commuting due to societal norms. Many participants were aged between 21 and 40. This shows that younger adults are taking more interest in the survey. Commuters in this age bracket often move around more and face greater transport challenges. Many respondents were married, which could shape how they view transportation and environmental concerns because of family responsibilities. Most commuters who answered had at least a degree showing they were a educated group.

Table 1. Respondent Characteristics

Percentage (%)	Frequency (n)	Category	Variable
65.4	259	Male	Gender
34.6	137	Female	
14.1	56	Below 20	Age Group
54.6	216	21–40	
28.5	113	41–60	
2.8	11	Above 60	
33.1	131	Single	Marital Status
63.6	252	Married	
2.5	10	Divorced	
0.8	3	Widowed	
3.3	13	No Formal Education	Education Level
9.3	37	Primary (1–8)	
18.9	75	Secondary (9–12)	
28	111	Diploma	
40.4	160	Degree and Above	
37.4	148	Government/Private	Employment Status
41.9	166	Self-employed	
7.1	28	Student	

13.6	54	Unemployed	
			Monthly Household
7.3	29	Below 2,000 ETB	Income
26.3	104	2,001–5,000 ETB	
41.2	163	5,001–10,000 ETB	
25.3	100	Above 10,000 ETB	

Table 2 highlights specific sets of individuals in the community who face bigger risks from transport-related issues. This group faces the most harm because of their constant contact with vehicle emissions and noise while working close to busy streets. Older commuters face higher health risks from pollution because aging makes them more vulnerable.

Table 2. Vulnerable Groups Affected by Transport Pollution

Percentage (%)	Frequency (n)	Vulnerable Group
32.80%	130	Roadside workers and vendors
24.00%	95	Elderly
23.00%	91	Pregnant women
18.20%	72	Patients with chronic Conditions
17.40%	69	Children

Table 3 shows the methods the community prefers to address transport-related pollution. The community favours stricter rules on vehicle emissions to improve air quality. Using public transportation is considered a keyway to cut back on the use of private cars. Green infrastructure, the community believes, helps reduce pollution and acts as a shield against noise. Teaching commuters about the dangers of transport pollution and how to adopt sustainable habits is seen as vital to engaging the community. Encouraging commuters to use electric vehicles is considered a new way to cut down pollution caused by regular fuel-powered cars. This research shows that the road transport network in Samara-Logia City, which serves as an important freight corridor for the country creates serious environmental problems that are not well-handled affecting the local community. The key results highlight widespread public worry about these challenges pointing to obvious shortcomings in current transport rules and planning.

Table 3. Suggested Strategies for Mitigating Transport Pollution

Percentage (%)	Frequency (n)	Suggested Strategy
19.40%	77	Stricter emission controls
18.90%	75	Improved public transport
10.10%	40	Planting trees and green areas
9.90%	39	Awareness campaigns
8.60%	34	Promotion of electric vehicles

VI. CONCLUSIONS

The study highlighted that air pollution from vehicles and noise pollution are seen by the community as the biggest environmental risks. It also showed clear environmental inequality, as vulnerable groups like roadside workers and older individuals face unequal levels of exposure to these issues.

Commuters in the community back technical solutions. They focus on strengthening emission rules and making public transportation systems better. This push from the public for cleaner and more sustainable transportation matches modern urban transport planning efforts.

In summary, transportation in Samara-Logia affects the environment not as a social challenge but as a result of missing coordination between engineering and policy measures. Addressing this requires taking quick steps in three main areas. Authorities need to start tracking emissions from transport through well-organized monitoring systems. They also need to check vehicles with tough inspection rules. , they must put money into building eco-friendly transport systems.

VII. RECOMMENDATIONS

The research suggests both technical solutions and policy changes to cut down environmental harm from road transport while improving sustainable urban travel in Samara-Logia. Local authorities should work together to set up stations to measure air quality and noise in areas with heavy traffic and major freight routes. These stations would give essential data to measure the extent of pollution from vehicles and confirm whether commuters's concerns about risks are valid.

Set up regular and planned inspection and maintenance schedules to check all vehicles. Focus on older heavy-duty vehicles driving through the freight corridor. Ensure these vehicles follow Ethiopian or nearby countries' emission rules.

Set aside funds to build safe sidewalks and bike paths. Prioritize this in neighborhoods and areas where vulnerable commuters need access to services they depend on. This helps commuters move around and avoid pollution from vehicles.

Run environmental awareness programs designed for different groups identified through cluster analysis. Educational efforts should build existing interests from educated communities to gather strong public backing for eco-friendly transport policies.

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