Clean Air in Jakarta:
Gaps and Possibilities Toward Low Emission Practices

Study conducted by:

p::pulix Vital Strategies

Acknowledgment

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EXECUTIVE SUMMARY

Jakarta is facing a prolonged air pollution crisis, primarily driven by motorized transportation, open waste burning, and industrial emissions. To address this, there is a growing need to implement comprehensive low emission zone (LEZ), which are designated areas aimed at reducing air pollution through both compliance with emission standards and community-driven co-creation of solutions. The LEZ concept embodies a dual approach: reducing emissions from both stationary and mobile sources while integrating air pollution control and greenhouse gas reduction into a unified policy framework.

To inform this policy transition, Populix and Vital Strategies conducted two phases of research under the Breathe Cities initiative in Jakarta, also known as Breathe Jakarta. The first phase, a perception survey conducted in 2024, captured baseline insights from 800 respondents across Jakarta. The second phase, a distributional impact study, was conducted in 2025 in 10 sub-districts designated as study areas for low emission practices, involving 622 residents. This phase examined community dynamics, challenges, and disparities in LEZ's impacts across different socio-economic and high-risk groups, and included a significant proportion of older people, people with disabilities and outdoor workers.This white paper synthesizes the findings from both phases to offer a grounded, equity-driven analysis of Jakarta's LEZ transition. The research found high levels of public concern about air pollution and strong support for clean air initiatives like LEZs. However, awareness often fails to translate into consistent protective behaviors, due to structural limitations such as inadequate access to public transport, waste facilities and green spaces. Communities at higher risk of air pollution harms bear a disproportionate burden of exposure while facing greater barriers to adaptation.

While residents generally endorse clean air policies, many lack clarity about their mechanisms and feel excluded from decision-making processes. Interpersonal communication channels—particularly RT/RW leaders and neighborhood-based WhatsApp groups—emerged as the most trusted means for policy outreach, while formal or digital messaging had limited reach.

Finally, the research results emphasize the need for inclusive communication, supportive infrastructure, and responsive enforcement so that clean air is accessible not just in principle, but in everyday practice. By applying behavioral frameworks, the research also enables tracking of behavioral shifts over time and identification of priority areas for targeted interventions. The research results help foster greater public awareness, shift structural conditions, enable deeper community participation, and support long-term behavioral change toward cleaner and health.

Abbreviations

Air Pollution	The presence of harmful substances in the air, including particulate matter (PM2.5), nitrogen oxides (NOx), and other pollutants that affect health.
PM2.5	Fine particulate matter with a diameter of 2.5 microns or smaller. It can penetrate deep into the lungs and bloodstream, posing serious health risks.
LEZ (Low Emission Zone)	A designated area, road network, and/or road segment designed to reduce air pollution and greenhouse gas emissions.
ERP (Electronic Road Pricing)	A congestion pricing system where vehicles are charged for entering certain areas during peak hours, used to reduce traffic and pollution levels.
TPS (Tempat Penampungan Sementara)	Temporary waste collection point in urban neighborhoods, where residents dispose of household waste before it is transported to larger facilities.
ProKlim (Program Kampung Iklim)	A government initiative led by the Environmental Agency (DLH) to promote community-based climate adaptation and mitigation efforts.
RT/RW (Rukun Tetangga/ Rukun Warga)	The smallest units of local governance in Indonesia, responsible for neighborhood-level coordination and communication.
Populations at Higher Risk of Air Pollution Harms	Groups more likely to be affected by air pollution or less able to adapt, including older people, people with disabilities, outdoor workers, and people in low-income households
Open Waste Burning	The practice of burning household or community waste in open spaces, contributing significantly to local air pollution and health risks.
First/Last Mile Connectivity	The ease of access between a person's starting point or final destination and the nearest public transportation service.

Adaptive Capacity	The ability of individuals or communities to respond to and cope with environmental hazards, such as pollution, through behavioral or structural means.
Dinas Lingkungan Hidup (DLH)	Provincial government agency responsible for environmental management. Leads coordination of environmental components, including air quality monitoring, public communication on pollution risks, and ProKlim integration.
Dinas Perhubungan (Dishub)	Provincial government agency responsible for regulating and enforcing vehicle access in LEZ areas, emission testing, traffic management, and development of low-emission mobility systems.
Kelurahan and Kecamatan Offices	Local government administration units that serve as frontline governance; they facilitate outreach, coordinate community meetings (RT/RW), and collect feedback from residents.
RT/RW (Community Units)	A community-based organization supported by the local government, mobilizing women and families in environmental and health awareness activities. Often leads waste sorting and clean-living campaigns.
Karang Taruna (Youth Organizations)	A civil society youth organization, active at the neighborhood level. Engages local youth in environmental education, clean-up events and LEZ outreach, especially at the grassroots level.
BPS	Indonesia's Central Statistics Agency, responsible for collecting and publishing national statistical data, including demographics, socio-economic indicators, and environmental statistics.
UMKM	Micro, Small, and Medium Enterprises in Indonesia. These businesses form the backbone of the economy and include small-scale traders, services, and producers.
Ojek Drivers	Motorcycle taxi drivers, operating either independently or via ride-hailing apps (such as Gojek or Grab). They are a major segment of informal-sector workers in Jakarta and are highly exposed to air pollution due to long hours spent on the road.
B3 (Bahan Berbahaya dan Beracun)	Hazardous and Toxic Substances, as defined in Indonesian regulations. Refers to materials that pose risks to human health or the environment and require special handling and disposal.

CHAPTER I

Background and Objectives

1.1 Background

Jakarta faces a prolonged and intensifying air pollution crisis that threatens the health, productivity, and well-being of its more than 10 million residents. As a rapidly urbanizing megacity, Jakarta consistently records air quality levels far above safe thresholds, with particulate matter (PM2.5) concentrations often exceeding six times the World Health Organization's guideline of 5 µg/m³. The situation worsens during the dry season (June to September), when stagnant air, increased motor vehicle activity, and frequent open waste burning contribute to severe pollution spikes.

Figure 1. Annual Average PM2.5 Levels in Jakarta vs. WHO Guideline

2019 Jakarta PM2.5	49.45 µg/m³
WHO Annual Guideline	5 µg/m³
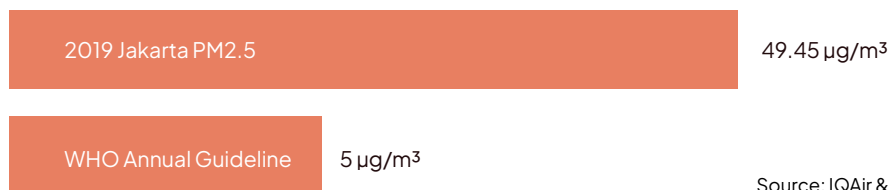
Source: IQAir & WHO annual guideline

The public health implications are well documented. Long-term exposure to PM2.5 is associated with elevated risks of respiratory illness, cardiovascular disease and premature death. These risks disproportionately affect certain higher-risk populations. Children face greater health impacts because their lungs and immune systems are still developing, while older adults are more vulnerable due to higher prevalence of chronic conditions and declining respiratory capacity (WHO, 2021; HEI, 2020). Outdoor workers are more exposed because they spend long hours in polluted environments. People with disabilities are often at higher risk because protective infrastructure is not always accessible to them. For example, air filtration devices may be unaffordable and many public green spaces are not designed to accommodate their needs.

Jakarta's air pollution stems from multiple and overlapping sources, with motorized transportation remaining the dominant contributor. As of August 17, 2023, data from the Indonesian National Police recorded 23 million registered vehicles in DKI Jakarta, of which 18.33 million (79.6%) were motorcycles and 3.8 million were passenger cars. On average, this equates to nearly two vehicles per resident, and a significant portion of the fleet consists of older vehicles with limited emission-control technology, many of which are not regularly inspected or maintained. Source apportionment analysis conducted by Vital Strategies and the Bandung Institute of Technology (ITB, 2022) shows that motorized vehicles contribute between 32–57% of Jakarta's ambient PM2.5 concentrations, making transportation the single largest source of air pollution in the city. In addition to transportation, household and small-scale industrial combustion, particularly in informal neighborhoods, adds localized emissions from wood, coal and diesel use. Widespread open waste burning, especially in areas lacking formal waste services, further compounds the problem. Construction dust, road particulate matter, and occasional transboundary pollution from nearby regions also intensify Jakarta's air quality challenges.

The burden of environmental degradation is not equally distributed. Lower-income communities, particularly in North and West Jakarta, often face overlapping exposure to traffic, industry, and unregulated burning, while middle-up income areas tend to benefit from greater tree cover, cleaner infrastructure, and better access to protective resources. At the same time, air quality data also suggest that South Jakarta is not exempt from high-risk exposure, partly due to transboundary emissions. This disparity highlights not just a public health issue, but a matter of environmental justice: those least responsible for emissions are often the most exposed and least equipped to respond.

1.2 Jakarta's Policy and Public Context

In response to these challenges, the Jakarta Provincial Government has introduced a suite of environmental policies, with the low emission zone (LEZ) policy emerging as a key instrument for tackling urban air pollution. First launched in Kota Tua in 2021, the so-called low emission zone primarily involved pedestrianization across five streets surrounding Fatahillah Square, improving walkability and public transport access. However, the intervention did not include emission-based vehicle restrictions, and therefore functions more as a pedestrianization pilot rather than a full low emission zone (LEZ). (ITDP, 2024). This early experience underscores the need for a more comprehensive LEZ framework that integrates emission compliance with community-driven approaches to achieve both air pollution and greenhouse gas reduction.

Recognizing the need for a more comprehensive and socially inclusive approach, the government later expanded the initiative into the low emission zone (LEZ) implementation plan, which serves as an integrated framework for reducing emissions and improving air quality. Unlike the initial LEZ, which focused primarily on vehicle restrictions, the current LEZ implementation plan incorporates multiple sectors and emphasizes the importance of local engagement. This integrated approach includes components such as:

- Improved waste management systems to reduce open burning.

- Expansion of green open spaces (*ruang terbuka hijau*, or RTH).

- Community-based education and behavioral change campaigns.

- Support for cleaner energy adoption at household and neighborhood levels.

The LEZ was introduced in 10 sub-districts designated as study areas, selected to reflect high exposure levels, socio-economic diversity, and relevance for future policy rollout. The selection also considered the presence of community-led environmental initiatives, geographic balance across Jakarta's five administrative regions, and the inclusion of neighborhoods with high proportions of populations at greater risk of air pollution harms—such as older adults, outdoor workers, and people with disabilities. Each site involves coordination between urban village (kelurahan) offices, the Environmental Agency (DLH), Transport Agency (Dishub), and community groups such as RT/RW, PKK (Family Welfare Movement), and Karang Taruna (Youth Organizations). In several locations, LEZ activities intersect with Program Kampung Iklim (ProKlim), a community climate resilience program initiated by DLH that provides a platform for environmental action at the grassroots level.

What distinguishes the current low emission zone (LEZ) framework is its equity-focused orientation. The framework is designed with the understanding that not all communities have the same capacity to adapt to environmental changes. Success, therefore, requires more than enforcement; it calls for enabling infrastructure, affordable alternatives, and localized communication strategies that reflect the realities of Jakarta's most affected neighborhoods. In other words, cleaner air must be a public good accessible to all, not a privilege for the few.

To support evidence-based policymaking, two research phases were carried out as part of this study. Phase 1 (Perception Survey, 2024) gathered citywide data on public awareness, behavioral patterns, and policy acceptance. Phase 2 (Distributional Impact Study, 2025) focused not on full-scale implementation, but rather on localized applications of clean air practices intended to inform the broader rollout of LEZ strategies. Together, these studies provide the analytical foundation to assess how effectively the LEZ initiative is reaching its goals, and what adjustments may be needed to make the policy truly inclusive and effective.

1.3 Study Objectives

This study aims to provide a robust evidence base to support the development, communication and community alignment of the low emission zone (LEZ) framework in Jakarta. Rather than evaluating a fixed policy, the research explores how the public perceives and experiences air pollution and greenhouse gas emissions, as well as how they respond to various proposed or ongoing interventions within the LEZ framework.

The specific objectives include:

- To understand public awareness, knowledge, and attitudes regarding air pollution and greenhouse gas emissions, along with their key contributing factors such as vehicle emissions, waste burning, and limited green space coverage, without restricting the focus to formal policy instruments.

- To assess individual and household behaviors that influence air quality and emission levels, including travel patterns, waste disposal practices, energy usage, and protective health measures such as mask-wearing or activity adjustment.

- To analyze the distributional impacts of air pollution and LEZ-related interventions across different population groups, with particular attention to those at higher risk, such as older adults, people with disabilities, outdoor workers, and residents from low-income households.

- To explore the perceived feasibility and fairness of proposed LEZ components from the community perspective, helping to shape more acceptable, inclusive, and context-sensitive implementation strategies.

- To generate insights that support the design of targeted communication materials and engagement strategies by identifying behavioral barriers, trust dynamics, and support needs, thereby enhancing community participation in the LEZ transition across diverse urban settings

CHAPTER II

Methodology

2.1 Study Flow

Beyond its function as a standalone research endeavor, this study was designed as an integral part of a broader intervention cycle aimed at reducing air pollution through policy, communication and community engagement. The two survey phases were positioned within a structured programmatic framework to inform, refine and evaluate public-facing activities, particularly under the LEZ initiative.

As illustrated in the activity flow chart, the research process was embedded in a sequential logic:

Figure 2. Activity Flow

Pre Activity (kick off)
Communication & Campaign

Formative Phase

Output: Study Design, Perception Survey

Follow-up Action: Baseline study measurement adjustments

Distributional Impact Research (piloting area)

Output: Preliminary Overview Report

Follow-up Action: Adjustment of Communication and Mentoring Materials

Pre Activity (kick off)
Communication & Campaign

Communication Material Development

Output: Communication and mentoring materials based on baseline study results

Follow-up Action: Coordination with the Mentoring Team

Feedback

Selection of suitable materials, Concept Test can be conducted on a specific sample before being implemented across the entire target audience.

Distributional Impact Study Comprehensive Report

Output: Study Report

Action: Coordination with all related teams. Get a comprehensive overview of all activities that have been carried out.

Communication Activity & Program Activity

- The formative phase, through the 2024 Perception Survey, generated baseline data to inform early adjustments in communication strategies and mentoring tools.

- This was followed by distributional research in selected pilot areas in 2025, deepening understanding of the localized implications of LEZ, particularly its social, behavioral, and equity implications for communities exposed to high

levels of air pollution, and offering context-specific recommendations. This second phase also incorporated a series of in-depth interviews with residents and local community leaders, including RT/RW heads, PKK members, and Karang Taruna representatives, adding qualitative nuance to the quantitative findings.

- Based on the research insights, communication and mentoring materials were developed and iteratively improved through coordination and testing.

- Prior to large-scale dissemination, selected concepts underwent feedback and concept testing for relevance and receptivity.

- Finally, full-scale communication and program activities were implemented with structured learning loops in place, so that real-time data and findings could be reintegrated into ongoing activities.

- All research activities were reviewed and approved under the Breathe Cities program through Vital Strategies. Participation was voluntary, with informed consent obtained from all respondents, and all data were anonymized to ensure confidentiality.

2.2 Survey Design and Sampling Strategy (Quantitative)

This white paper is grounded in two sequential survey phases conducted between 2024 and 2025. Both were designed to generate empirical insights into how Jakarta residents perceive air pollution and respond to regulatory interventions such as the low emission zone (LEZ), which integrates both air pollution reduction and greenhouse gas (GHG) mitigation. The two phases are distinct in scope and focus but complementary in analytical value. Phase 1 offers citywide general perceptions, while Phase 2 zooms into specific sub-districts to explore distributional impacts and local dynamics.

Several core instruments, such as questions on daily mobility, etc., were repeated across both phases to enable longitudinal comparison and consistency. In addition, the design enabled Phase 2 to deepen and extend Phase 1 findings by capturing more granular data from targeted pilot areas. This dual-phase structure allowed for both a macro-level overview and a micro-level understanding of behavior, perceptions, and equity implications related to clean air initiatives in Jakarta.

The study was conducted in two distinct phases:

Table 1. Phase 1 and Phase 2 Survey Designs

	Phase 1: Perception Survey	Phase 2: Distributional Impact Study
Year	2024	2025
Context	General citywide policies on LEZ, ERP, vehicle rules	Community-level perceptions and experiences related to air pollution exposure, its social and behavioral impacts, and local clean air practices within the LEZ context
Scope	Citywide (Jakarta)	10 sub-districts (*kelurahan*)
Sample size	800	622
Sampling method	Stratified random	Quota-based
% Higher–risk groups	25% - Pregnant women (6,3%) - Older adults, aged 60+ (6,3%) - People with disabilities (6,3%) - Parents with children (6,3%) - Outdoor workers (6,3%)	42% - Pregnant women (2%) - Older adults, aged 60+ (5%) - People with disabilities (4%) - Parents with children (19%) - Outdoor workers (12%)
Focus	Awareness, perception, baseline	Localized exposure, inequality, impact

Phase 1: Perception Survey (2024)

This first phase aimed to capture a citywide baseline of public perceptions, awareness, and behavioral responses to Jakarta's worsening air pollution and the government's mitigation implementation plan. Conducted in 2024 with 800 respondents, the survey employed stratified random sampling to balance representation across gender, generation, socio-economic status, and disability status. A total of 25 percent of the sample (n = 200) represented higher-risk populations, recruited intentionally through a quota-based approach to ensure adequate representation across key vulnerable groups. These included people with disabilities, pregnant or breastfeeding women, older adults, and outdoor workers such as motorcycle taxi drivers, couriers, street vendors, and parking attendants.

The survey explored public knowledge and opinions about major policy instruments, including low emission zone (LEZ), Electronic Road Pricing (ERP), vehicle age restrictions, and the ban on open waste burning, while also examining daily exposure patterns and attitudes toward behavioral change.

Phase 2: Distributional Impact Study (2025)

The second phase of the study focused on understanding community-level perceptions and experiences related to air pollution exposure, its social and behavioral impacts, and localized clean air and mitigation actions within the LEZ context. Conducted in 2025, this phase engaged 622 respondents from 10 sub-districts (kelurahan) across Jakarta's five administrative regions: North, West, East, Central, and South. The selected sub-districts were Semper Barat, Pejagalan, Tegal Alur, Joglo, Bambu Apus, Jatinegara Kaum, Johar Baru, Kebon Kosong, Kebayoran Lama Selatan, and Kebagusan. Each area contributed roughly 10 percent of the total sample, with Kebagusan slightly oversampled (11 %) to balance demographic diversity.

These locations were chosen based on variation in air quality data, prevalence of health-related issues linked to air pollution, and socio-economic diversity, ensuring representation across different urban contexts. In addition, 35 percent of respondents came from RW units participating in ProKlim (Kampung Iklim), a national community-based climate program initiated by the Ministry of Environment and Forestry (KLHK) and implemented locally by the Environmental Agency (DLH) to promote climate adaptation and clean air actions at the neighborhood level. This inclusion allowed for comparisons between community-led environmental action zones and standard non-ProKlim areas.

Quota-based sampling ensured representation of key groups at higher risk of air pollution exposure, which accounted for 42 % of the total sample. These groups included older adults, people with disabilities, pregnant or breastfeeding women, parents with children, and outdoor workers (for example, motorcycle taxi drivers, couriers, and street vendors). The design enabled a close examination of inequality in exposure, adaptive capacity, and lived experiences of residents in relation to ongoing clean air efforts and LEZ-related community actions.

Table 2 Sampling

Jakarta	Sub-districts	%	n
North Jakarta	Semper Barat	10%	60
	Pejagalan	10%	60
East Jakarta	Bambu Apus	10%	61
	Jatinegara Kaum	10%	62
West Jakarta	Tegal Alur	10%	60
	Joglo	10%	60
Central Jakarta	Johar Baru	10%	62
	Kebon Kosong	10%	61
South Jakarta	Keb. Lama Selatan	10%	64
	Kebagusan	11%	70

Respondent Characteristics Across Both Phases

Across both survey phases, respondent characteristics were broadly consistent and reflective of Jakarta's urban demographics. Gender distribution was balanced, with women making up a slight majority. Generational composition followed proportional weights based on population data from Badan Pusat Statistik (BPS), Indonesia's national statistics agency, with Millennials (ages 28–43) forming the largest group, followed by Gen Z (ages 18–27) and Gen X/Boomers (over 44).

**Figure 3. Respondent Profile in the Survey Phase 2
Base: All respondents (n=622)**

Source: Populix Phase 2 Survey

Gender

Male
49%

Female
51%

Generations

Gen Z (18–27 years old)	**23%**
Millennials (28–43 years old)	**40%**
Gen X & Boomers (>44 years old)	**37%**

Socio-Economic Status

Low
26%

Middle – Upper
51%

Middle
62%

Last Education

Primary (Elementary and Junior High School)	**11%**
Secondary (Senior High School or equivalent)	**44%**
Tertiary (Diploma/Bachelor/ Master/Doctoral)	**45%**
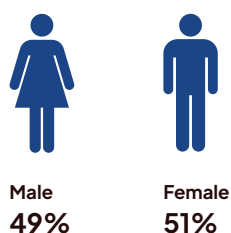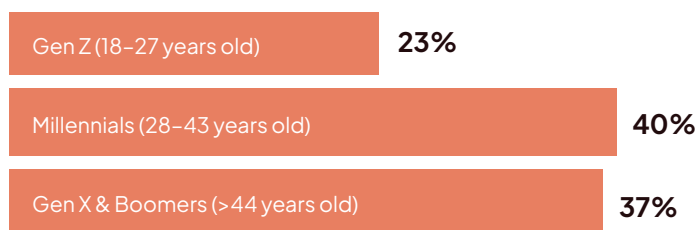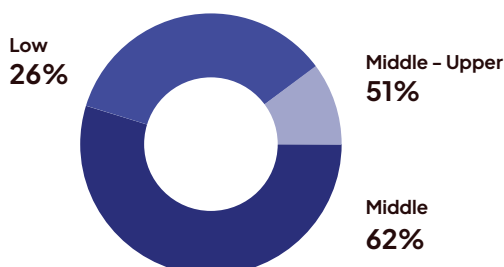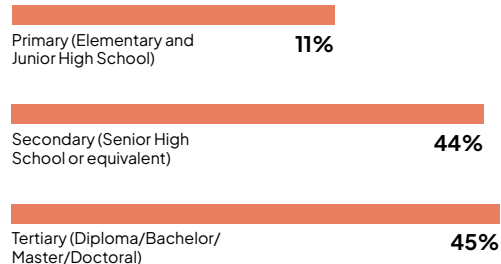
In terms of education, the majority of respondents had completed secondary schooling (high school or equivalent), while a substantial proportion held tertiary degrees, including diplomas, bachelor's and postgraduate qualifications. This educational distribution suggests high formal education exposure across Jakarta's adult population.

Socio-economic stratification, based on self-reported monthly household expenditure, was grouped using classification thresholds adapted from BPS, as follows:

- Low income: under Rp2,000,000 up to Rp3,500,000/month

- Middle income: Rp3,500,001–Rp8,000,000/month

- Middle-upper income: over Rp8,000,000/month

The majority of respondents (62%) fell into the middle-income group, which covers households spending between Rp3,500,001 and Rp8,000,000 per month. Meanwhile, 26% were in the low-income group (under Rp2,000,000 up to Rp3,500,000), and 12% in the middle-upper bracket (over Rp8,000,000). This distribution enabled disaggregated analysis of air pollution exposure, behavioral constraints and adaptive capacity across economic tiers.

Both surveys captured a diverse range of employment types. The largest share of respondents were private-sector employees, followed by professionals, micro, small and medium enterprise (MSME) owners and workers, civil servants, and informal sector workers. Outdoor and high-exposure jobs, such as vendors, motorcycle taxi (ojek) drivers, sanitation workers and couriers, were particularly prominent in the Phase 2 sample, in alignment with the focus on distributional impact.

2.3 In-depth Interview Design (Qualitative)

In addition to the two survey phases, this study employed a qualitative approach through in-depth interviews to capture deeper, contextualized insights from key community representatives. These interviews served to enrich the quantitative findings by unpacking the lived experiences, perceptions, and challenges faced by residents and local stakeholders in relation to air pollution exposure, clean air initiatives, and community adaptation within the LEZ context.

Figure 4. In-depth Interview Sampling Flowchart
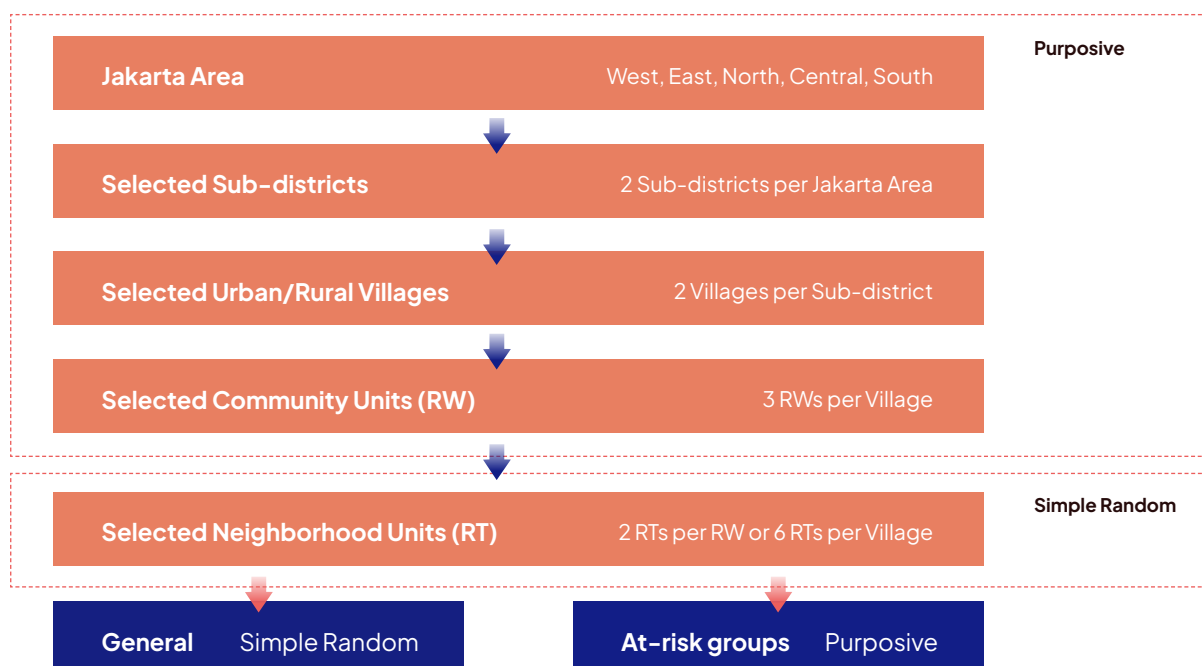
The in-depth interviews were conducted across the same 10 pilot sub-districts as the Phase 2 survey. In each location, two informants were selected using purposive sampling: one male and one female respondent, enabling gender balance and diversity of perspectives. This brought the total number of interviews to 10 informants across Jakarta's five administrative regions.

Interviewees included residents, community leaders (e.g., RT/RW heads), and local people involved in neighborhood-level initiatives, such as ProKlim. The qualitative data provided a nuanced understanding of how policy messages are received, interpreted or contested at the grassroots level. These insights are particularly critical for designing inclusive communication and engagement strategies that reflect community realities and amplify vulnerable voices.

2.4 Research Framework and Instrumental Design

In order for the research to generate both actionable and context-rich insights, the design of the survey instruments was anchored in two key dimensions: behavioral responses and policy acceptance. The instruments were structured as primarily close-ended questionnaires administered via digital platforms by trained enumerators, and were designed to capture not only what people do or believe, but also why they behave the way they do and how they respond to government interventions.

The research framework for this study combines two complementary approaches: the KAP (knowledge, attitudes, practice) model and the IPAC (integrative public policy acceptance) framework.

Figure 5. Research Framework
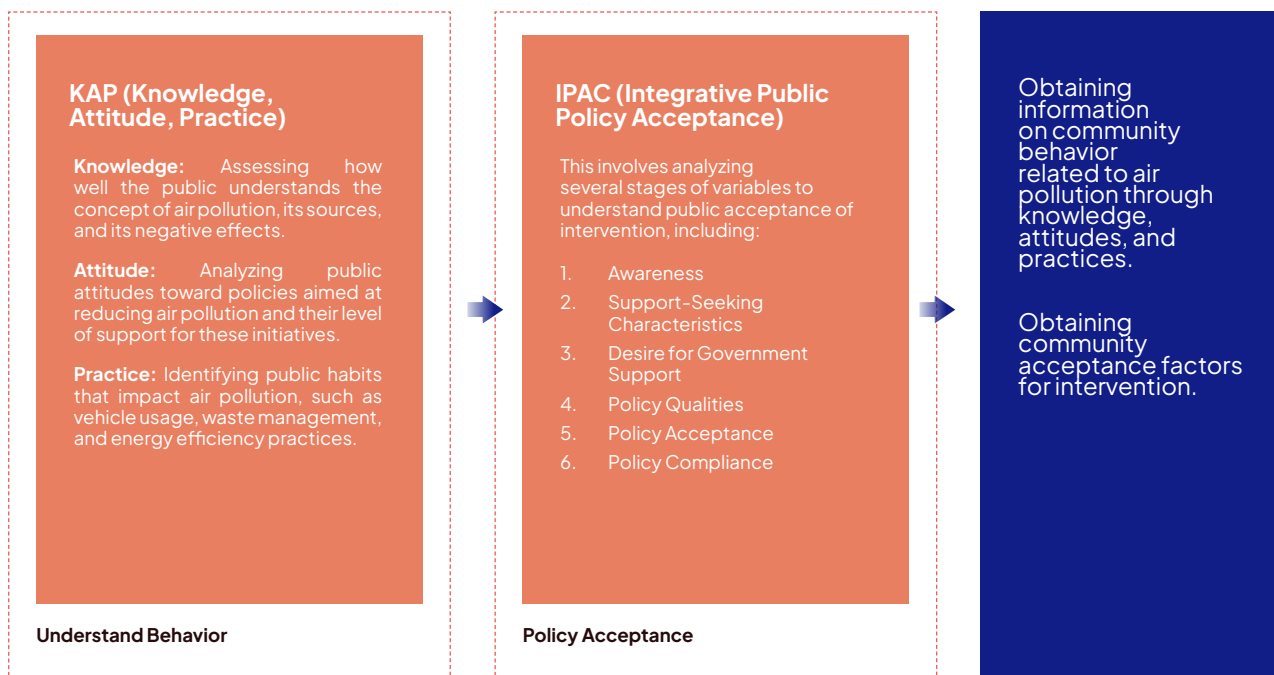
The KAP model helps identify how individuals perceive air pollution, what they believe about its risks and solutions, and how these beliefs translate into (or fail to translate into) daily practices. It also allows the study to identify key behavioral bottlenecks, such as lack of awareness, low motivation, limited belief in impact, or structural barriers like inadequate infrastructure. A tailored version of this framework was especially relevant for the baseline-endline structure of the study, enabling the research to track behavioral shifts over time and understand where interventions should be targeted.

The IPAC framework adds a second analytical layer by examining the public's relationship with policy. It assesses not only awareness and understanding of a regulation, but also trust in government, expectations for support, and perceptions of fairness and effectiveness. This framework was especially useful for understanding acceptance and compliance dynamics surrounding the LEZ implementation plan.

Together, the two frameworks form a holistic analytical foundation, capturing both individual behaviors and structural conditions, and highlighting where community-level interventions, incentives or communication are needed to bridge the gap between awareness and action.

Survey Modules

To operationalize these frameworks, the instruments included modules on:

- Air pollution awareness and perceived health impact

- Knowledge of LEZ, ERP and waste burning policies

- Daily practices related to transportation, energy use and waste disposal

- Environmental risk perception and personal coping strategies

- Attitudes toward policy, fairness and institutional trust

- Willingness to support and comply with clean air regulations

- Household characteristics and risk status

All instruments were piloted to confirm cultural relevance, linguistic clarity and alignment with the realities of Jakarta's diverse communities. The design enabled disaggregated analysis across variables such as generation, socio-economic status, risk and location, laying the groundwork for meaningful interpretation and policy translation.

CHAPTER III

Thematic Findings

3.1 Risk Perception and Exposure

Understanding how the public perceives air pollution and experiences its health impacts is a crucial foundation for shaping effective interventions. Risk perception influences how individuals prioritize protective behaviors and respond to policy initiatives. This section explores the extent to which residents recognize air pollution as a threat and highlights the disproportionate burden borne by groups at higher risk of air pollution harms. These insights set the stage for identifying where protective practices such as mask wearing, behavioral adjustments, and access to clean transport and green spaces are most urgently needed.

> **Findings from both survey phases indicate that while awareness of air pollution risks is high, protective practices remain inconsistent, particularly among outdoor workers and low-income groups with limited access to adaptive resources.**

3.1.1 Perceptions and Health Impacts of Air Pollution

Air pollution is not only widely recognized as a public issue in Jakarta—it is also experienced as a direct and routine health threat. In the 2024 Perception Survey (phase 1), nearly 9 out of 10 respondents (89%) agreed that air pollution poses a serious risk to public health. This high level of concern was consistent across generations, genders and socio-economic groups, and underscores that exposure to polluted air is perceived as a shared urban challenge.

Health-related complaints were prominent in the 2025 Distributional Impact Study (phase 2). Although only 6% of all respondents reported recent respiratory symptoms, this seemingly low prevalence reflects population-wide averages and masks significant variation by sub-area and risk status. For instance, Jatinegara Kaum (15%) recorded one of the highest prevalence rates of respiratory complaints among the 10 pilot areas. The sub-district is characterized by dense traffic corridors, consisting of narrow alternative routes frequently used by motor vehicles, and clusters of home-based industries such as tempe, tofu, and rice-cake (lontong) production that commonly rely on wood or charcoal for fuel.

Figure 6. Respiratory Complaints
Base: All respondents (n=622)
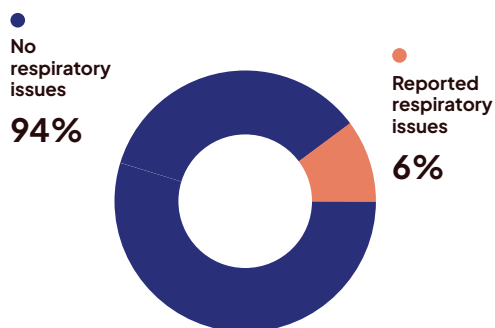
Region	No respiratory issues	Reported respiratory issues
Semper Barat	87%	13%
Pejagalan	93%	7%
Tegal Alur	90%	10%
Joglo	100%	
Bambu Apus	100%	
Jatinegara Kaum	85%	15%
Johar Baru	100%	
Kebon Kosong	92%	8%
Kebayoran L Selatan	92%	8%
Kebagusan	96%	4%

No respiratory issues
94%

Reported respiratory issues
6%

Source: Populix Phase 2 Survey

Among those reporting symptoms (n=36), the most common were runny or congested nose (44%), sore throat (19%), and persistent cough or asthma (14% each). Pregnant women and family members over age 60 were also affected, albeit in lower reported proportions. Respondents experiencing respiratory issues also reported different patterns in symptom occurrence, as illustrated in Figure 7. The majority (61%) indicated that their symptoms tended to occur during the rainy season, reflecting perceived seasonal variation in respiratory health. This pattern may be influenced by weather conditions or indoor activity during the rainy period, and further studies are needed to assess whether it is directly related to air pollution levels.

Figure 7. Pattern of Respiratory Issues
Base: Respondents experiencing respiratory issues (n=36)

Appears randomly with no specific pattern
19%

Occurs only during the rainy season
61%

Has only occurred in the last few months
8%

Occurs only during the dry season
8%

Occurs continuously
3%

Source: Populix Phase 2 Survey

Despite these health risks, protective behaviors remain basic and situational. In the citywide survey, only 45% of respondents reported "always" wearing a mask when traveling, while 36% said sometimes and 16% rarely, signaling gaps between awareness and consistent personal adaptation.

A closer look at households with children reveals similar gaps. Among 156 parents surveyed in Phase 2, only 24% consistently have their children wear masks, and only 28% regularly avoid outdoor activities on polluted days. Choosing cleaner travel routes is even less common, with just 4% always doing so. These results suggest that parental awareness is growing, but concrete protective routines have yet to solidify.

In Phase 2, respondents across all sub-district predominantly identified motor vehicle emissions (97%) and road dust (96%) as the main contributors to air pollution in their immediate surroundings. This reflects strong community-level awareness of daily exposure sources. In areas not covered by ProKlim, cigarette smoke and smoke from small food vendors or street kitchens were also frequently mentioned, highlighting hyperlocal pollution sources that are often overlooked in citywide discourse.

Figure 8. Air Pollution Sources
Base: All respondents (n=622)

Source	Percentage
Motor vehicle emissions	97%
Road dust	96%
Cigarette smoke	60%
Smoke from small food businesses (street food, satay vendors, etc.)	46%
Dust from construction projects	12%
Open waste burning	9%
Household waste burning (domestic burning activities)	7%
Factory smoke	5%
Smoke from firewood/kerosene cooking	3%
Smoke from generators/local power plants	0.2%
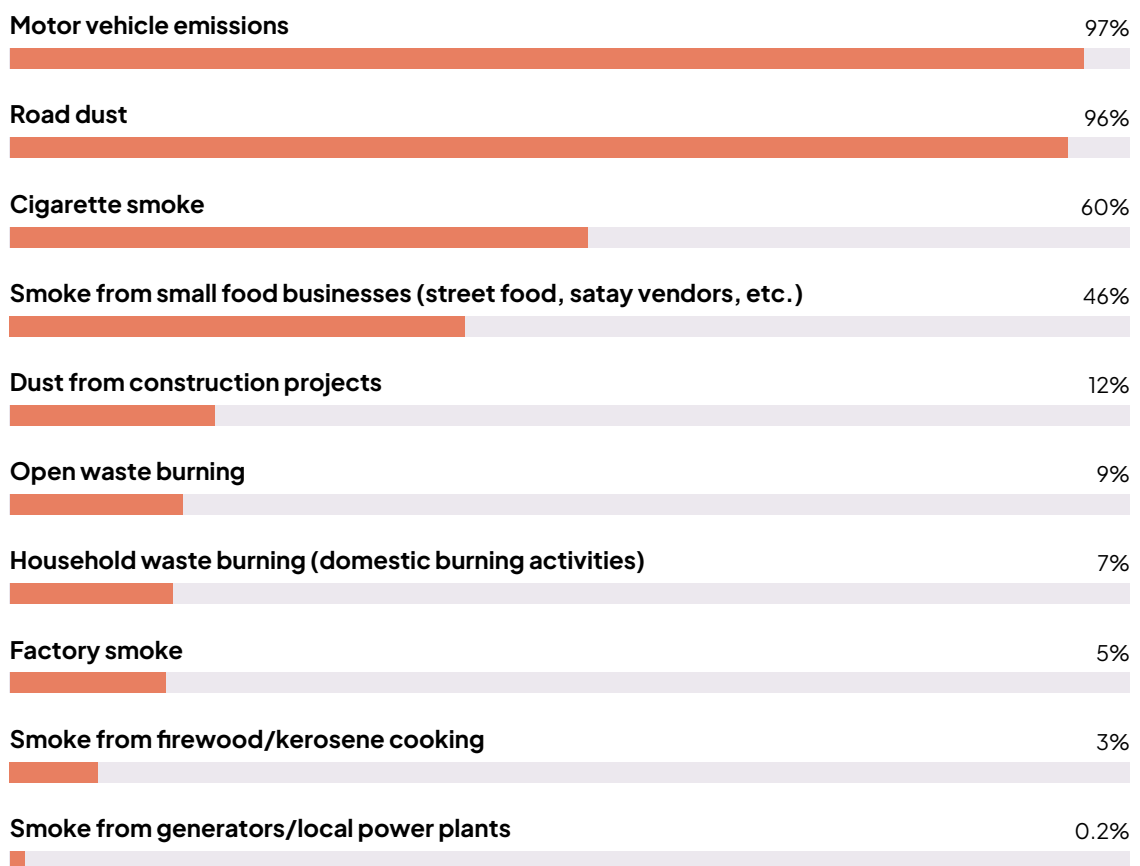
Source: Populix Phase 2 Survey

By contrast, Phase 1 respondents mostly cited broader and more institutionalized sources, such as public transportation, industrial trucks and factory emissions. This contrast suggests that community proximity influences how air pollution is perceived, with Phase 2 providing a more grounded picture of localized environmental burdens.

These findings highlight a persistent gap between awareness and action. While the health risks of air pollution are widely acknowledged, most adaptive practices remain reactive rather than preventive, often limited to peak pollution days or periods of visible symptoms.

3.1.2 Impacts on Populations at Higher Risk of Air Pollution Harms

The burden of air pollution in Jakarta is unevenly distributed, with certain population groups facing greater risks due to age, health conditions, occupations, or social roles. The Phase 2 survey intentionally included a higher share of respondents from groups considered more vulnerable, such as older adults, mothers of young children, people with disabilities, and outdoor workers, to better capture how air pollution and policy interventions affect them differently.

Across the ten pilot sub-districts for the low emission zone (LEZ) implementation plan, 40% of respondents were classified as at higher risk of air pollution harm. These groups not only experience higher exposure levels but also face more barriers in adapting or protecting themselves from pollution-related impacts.

Outdoor workers such as motorcycle taxi drivers, street vendors, and delivery personnel reported significantly higher rates of respiratory symptoms, particularly in areas like Semper Barat, Pejagalan, and Tegal Alur. Older adults frequently experienced breathlessness and fatigue, especially in neighborhoods with low tree cover or high traffic, while people with disabilities described difficulties accessing clean public spaces and health care, often depending on under-resourced caregivers.

Key Insights: Higher-Risk Populations

"
- **Certain groups, including older adults, mothers of young children, people with disabilities, and outdoor workers, face higher exposure and more limited ability to protect themselves from air pollution.**
- **Across ten LEZ implementation plan pilot sub-districts, 40% of respondents were classified as higher-risk and reported greater challenges in adapting to pollution-related impacts.**
- **Outdoor workers experienced frequent respiratory symptoms, older adults reported breathlessness and fatigue, and people with disabilities faced barriers accessing clean public spaces and healthcare.**

**Figure 9. Parental Behavior in Protecting Children From Air Pollution Exposure
Base: All respondents (n=622)**

Protective Action	Intensity (n=156)				
Avoiding outdoor activities for children during poor air quality	23%	49%		28%	Score (100) **76.28%**
Choosing cleaner travel routes for children to avoid polluted areas	4%	35%	37%	24%	Score (100) **68.91%**
Having children wear air masks when leaving the house		46%	28%	24%	Score (100) **67.47%**

■ Never   ■ Sometimes   ■ Often   ■ Always
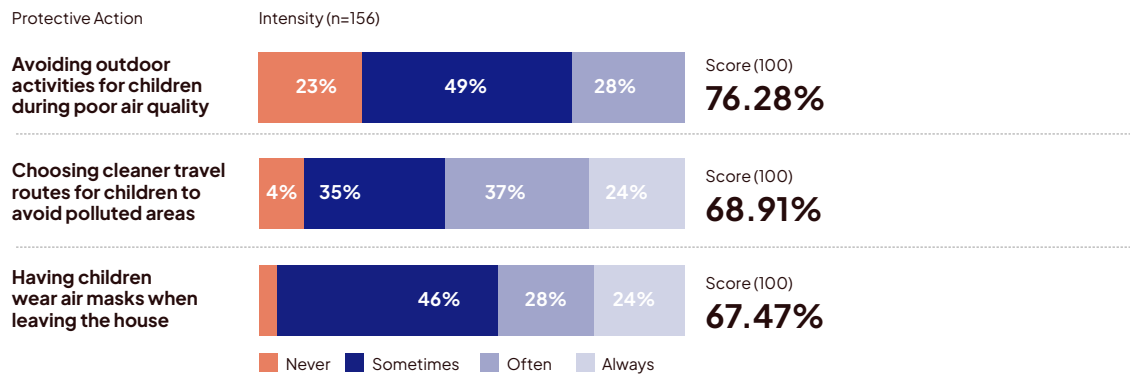
Source: Populix Phase 2 Survey

Among parents of young children, protective behaviors were evident, but limited in consistency. As shown in the previous section, only a minority reported routinely equipping their children with masks or adjusting travel routes to avoid polluted areas. This indicates that even where awareness exists, constraints in daily routines, transport options, or household income limit sustained protective action.

Importantly, risk is shaped not only by individual characteristics, but also by environmental and infrastructural conditions. Based on contextual analysis and secondary observations, households in lower-income areas are often more likely to:

- Live near major roads or industrial zones,
- Lack access to clean public transport or waste facilities, such as temporary waste collection points (TPS), which often leads to informal practices like open waste burning,
- Have poor air circulation due to dense housing, and
- Depend on informal work that requires daily outdoor mobility.

These structural conditions amplify the impact of pollution and reduce residents' ability to respond. While the low emission zone (LEZ) measures aim to cut emissions at the source, their success depends on addressing social and economic inequalities to prevent added burdens on higher-risk groups.

3.2 Policy Awareness and Public Acceptance

Policy effectiveness hinges not only on design but also on public understanding and support. While many residents may recognize policy names like LEZ or ERP, etc., a lack of clarity about their purpose or mechanisms can hinder compliance. This section examines public awareness, levels of policy understanding, and the willingness to adapt behaviors. The findings highlight critical knowledge gaps that must be addressed through targeted communication efforts.

3.2.1 Awareness and Understanding of Air Quality Policies

While air pollution is widely acknowledged as a serious issue in Jakarta, public understanding of government-led measures for low-emission purposes and other push policies to public transportation remains limited. The low emission zone (LEZ), introduced as a push policy to encourage shifts from private vehicles to public transportation, is among the best-known initiatives, yet findings from both survey phases show that few residents could clearly explain its objectives or how it operates.

Figure 10. Public Awareness Levels of Air Pollution Policies in Jakarta
Base: All respondents (n=800)

Protective Action	Intensity (n=156)				Awareness
Prohibition on Open Waste Burning	16%	32%	33%	19%	**84%**
Vehicle Age Restriction Plan	17%	35%	33%	15%	**83%**
Low Emission Zone	17%	43%	31%	9%	**83%**
Electronic Road Pricing (ERP) Plan	28%	32%	29%	11%	**72%**

Don't know at all ▪ Have heard but don't know the details ▪ Knowing a little bit of detailed information ▪ Know a lot of detailed information
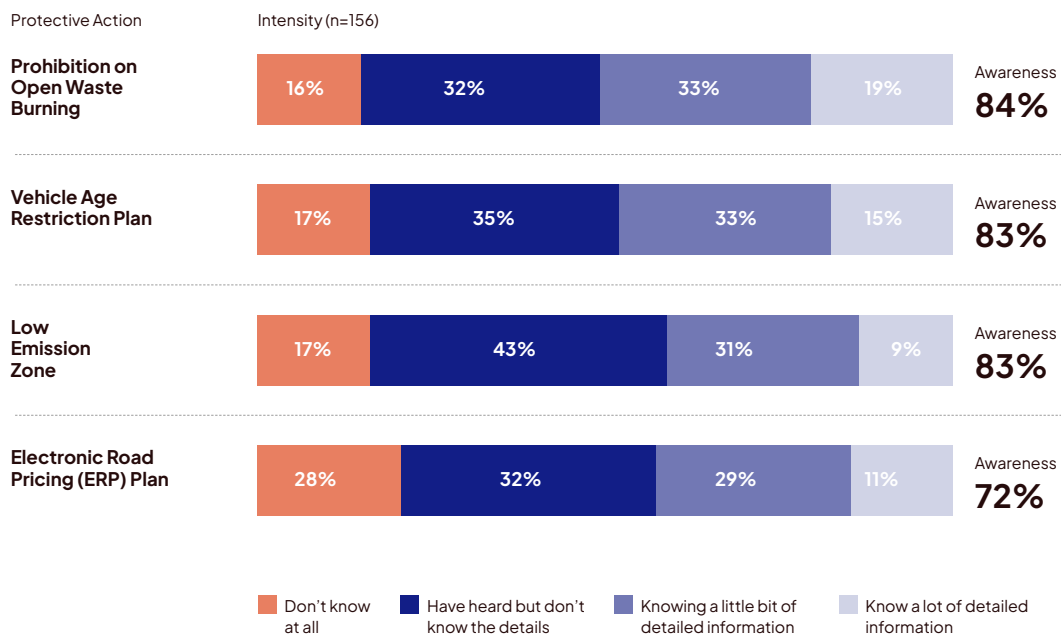
Source: Populix Phase 1 Survey

In the Phase 1 survey (2024), awareness of LEZs reached 83%, yet only 61% of those respondents could correctly identify that LEZs limit entry to vehicles with low emissions or those that pass an emission test. Many confused it with general traffic rules, like vehicle bans or pedestrian-only zones. ERP awareness was lower, at 72%, and understanding of its pricing and access mechanism was even less clear.

In the Phase 2 survey (2025), LEZ awareness stood at 82%, but only 55% of those who were aware could accurately define it. Neighborhoods like Pejagalan (88%) and Joglo (75%) showed the highest accuracy in understanding, while areas like Tegal Alur (18%) lagged behind. This variation suggests that local exposure to communication campaigns or trials may influence understanding.

Figure 11. Levels of Accuracy in Defining the Low Emission Zone
Base: All respondents (n=622)

Level of Awareness of Low Emission Zone
Base: All respondents (n=622)

Low Emission Zone | 18% | 31% | 37% | 14% | Awareness **82%**

Correct Definition Score **55%**

- Not aware at all
- Have heard the term but don't know the details
- Know a few details
- Know a lot of detailed information

LEZ Definition Test
Base: Respondents who claimed to be aware of LEZ (n=507)

- Only vehicles with low emissions or those that have passed an emissions test are allowed to enter the zone (Correct Answer) — **55%**
- Vehicle restriction in certain zones — **40%**
- Vehicle ban in certain zones — **3%**
- Only pedestrians allowed in the zone — **1%**

Source: Populix Phase 2 Survey

Critically, the data show that people in higher-risk populations, including outdoor workers, older adults and people with disabilities, were significantly less familiar with policy details. These groups, despite being among the most affected by air pollution, are also the least reached by conventional communication channels. This gap undermines the foundation for inclusive behavior change.

> " **The implications are clear: Public acceptance and compliance cannot be expected without building basic understanding first. It is not sufficient for residents to simply recognize policy names; they must grasp how these policies work, whom they affect, and what benefits they offer. For the LEZ implementation plan and similar interventions to be effective, communication strategies must go beyond visibility. They must prioritize clarity.**

3.2.2 Policy Support and Willingness to Adapt

Despite the relatively low levels of awareness about specific air quality policies, public support for government efforts to reduce pollution is remarkably strong. This suggests that while many residents may not fully understand the technical aspects of LEZs or other environmental regulations, they are still open to change, particularly if the benefits are clear and the process is perceived as fair.

In the Phase 1 survey, nearly 9 in 10 respondents (87%) expressed general support for government actions to reduce air pollution. Support was highest for policies that directly promote public well-being, such as improving public transportation access, controlling vehicle emissions and increasing green spaces. Even policies with potential behavioral or financial consequences, such as vehicle age restrictions and LEZs, received majority support when the purpose was explained clearly.

This support extended to the government's plan to implement electronic road pricing (ERP) as a congestion control tool. Around 78% of respondents expressed agreement with the ERP policy, and this level of acceptance rose to 90% when it was clarified that ERP revenue would be allocated to improve public facilities such as sidewalks, bike lanes and public transport. However, concerns about its potential negative effects were also evident. Over half of the respondents (56%) expected ERP to have a negative personal impact, citing difficulties in reaching certain destinations (69%) and changes in travel patterns (68%) as the most common concerns.

**Figure 12. Acceptance of Electronic Road Pricing
Base: All respondents (n=800)**

Acceptance of Electronic
Road Pricing Plan

	Agree (T3B) **78%**			Don't agree (B3B) **22%**

12%	36%	31%	13%	4%	5%
6 Strongly agree	**5**	**4**	**3**	**2**	**1** Strongly disagree
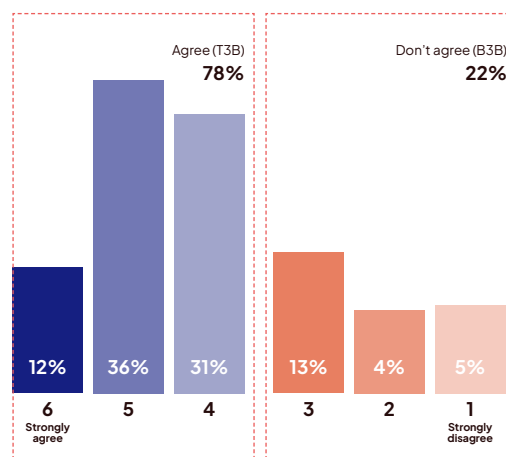
Acceptance of Use of Electronic
Road Pricing Plan for Public Facilities

	Agree (T3B) **90%**			Don't agree (B3B) **10%**

20%	42%	30%	5%	2%	3%
6 Strongly agree	**5**	**4**	**3**	**2**	**1** Strongly disagree
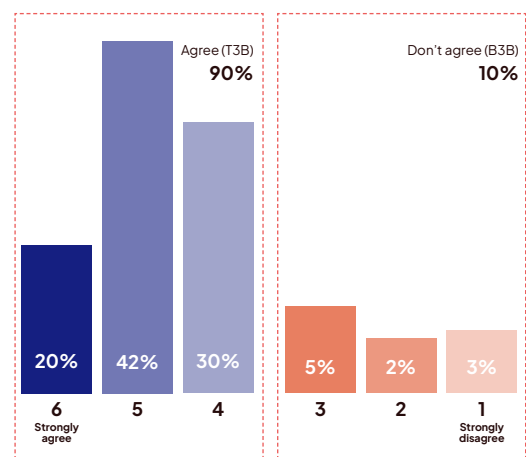
Source: Populix Phase 1 Survey

These findings provide a useful comparison point to the Phase 2 survey, which asked residents to choose between two potential LEZ implementation plan models: a comprehensive restriction scheme versus a paid access scheme. The vast majority (74%) preferred the comprehensive restriction model, suggesting that residents favor clear and equitable enforcement mechanisms rather than market-based or payment-driven approaches. The preference may reflect a broader belief that access to clean air should not depend on financial ability or willingness to pay.

Willingness to adapt was also evident in people's stated intentions. A large proportion of respondents indicated they would consider:

- Switching to public transport if it were cleaner, safer and more reliable.

- Sorting waste more consistently if supported by infrastructure, e.g., temporary waste storage facilities (TPS).

- Using non-motorized modes (e.g., walking, cycling) if pedestrian space were improved.

However, when probed further to include climate co-benefits to selected sub-districts in the Phase 2 survey, a more complex picture emerged. In a few sub-districts, residents expressed support for clean air policies in principle, but highlighted practical barriers to adapting their behavior. These included:

- Limited access to affordable and integrated public transportation, especially in areas like Kebagusan and Tegal Alur.

- Inconsistent waste collection services, reducing incentives for sorting at source.

- Lack of clarity about who would be affected by vehicle bans or how enforcement would work.

- Perceived unfairness in policy impact, particularly from informal workers or people from low-income households who rely on older vehicles or travel long distances daily.

In terms of vehicle ownership, Phase 1 survey results show that the vast majority of residents (87%) still do not own any low-emission vehicles. Bicycles were the most commonly owned alternative (7%), followed by motorcycles that passed emissions tests (4%) and electric motorcycles (2%). Although electric cars are the most well-known type of low-emission vehicle (recognized by 82% of respondents), ownership remains extremely rare—only 0.2% in Phase 2, despite the sample skewing toward middle-income households, and 4% in Phase 1.

Figure 13. Low-Emission Vehicle Ownership
Base: All respondents (n=622)

Low-Emission Vehicle Ownership

Bicycle	7%	Gasoline-powered car that has passed emissions testing	0.3%
Gasoline-powered motorcycle that has passed emissions testing	4%	Electric car	0.2%
Electric motorcycle	2%	Do not own any environmentally friendly vehicle	87%
Hybrid vehicle (combining electric and fossil fuel engines)	0,5%		
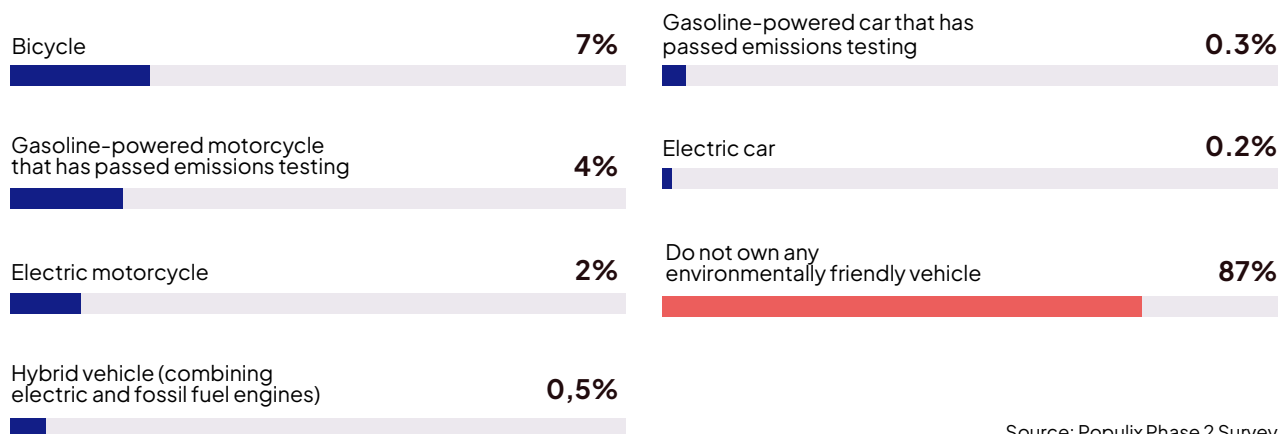
Source: Populix Phase 2 Survey

This discrepancy between awareness and actual ownership suggests that knowledge alone is insufficient without supportive infrastructure and economic incentives. In fact, while respondents are aware of a range of low-emission options—including hybrids (57%), hydrogen-based vehicles (35%), and those that meet exhaust standards (39%), their adoption remains marginal.

Supporting this point, most residents in Phase 1 reported owning gasoline-powered motorcycles (81%) or cars (27%), with nearly half of these vehicles aged between three and five years. This vehicle age profile may present challenges for LEZ implementation, as vehicles of this age or older are more likely to fall outside stricter emission standards, particularly if cleaner and more affordable alternatives remain limited.

Groups at higher risk, especially outdoor workers and single-income families, were more likely to support the goals of air pollution reduction but felt less confident in their ability to comply without support. This gap between aspirational support and practical readiness underscores the need for enabling conditions:

- Accessible, low-cost alternatives.

- Transparent communication.

- Incentives or assistance for those most likely to bear compliance costs.

Jakarta's residents are not resistant to change—most support it. But support alone does not translate into action unless the systems around them enable it. For LEZ to succeed in the long term, implementation must be accompanied by measures that lower the cost of adaptation, not just financially, but in terms of time, access and trust.

3.3 Daily Practices and Structural Enablers

Behavioral change is not driven by awareness alone; it depends on whether the surrounding environment enables or restricts action. Access to transport, waste facilities, green space and clean energy plays a major role in determining whether residents can adapt to cleaner practices. This section identifies key infrastructural and systemic barriers that shape daily behavior and limit participation in actions to reduce the harms of air pollution.

3.3.1 Transportation Patterns and Accessibility

Transportation is one of the main contributors to air pollution in Jakarta. Shifting travel behavior from private motorized vehicles to more sustainable modes is essential to reduce emissions and support the success of the low emission zone concept. Data from both survey phases indicate that accessibility, convenience, cost and travel time are key factors influencing transportation patterns.

Dominant Modes and Daily Habits

In Phase 1, public transportation was used by 56% of respondents, slightly higher than the 44% who relied on private vehicles. Among public transport users, TransJakarta Bus was the most common mode (67%), followed by Mikrotrans (43%) and KRL (40%). However, only about a quarter (26%) used public transport regularly (4–5 days a week), suggesting that for many, it functions mainly as a connecting mode between first and last mile rather than a primary means of travel.

By Phase 2, patterns of daily mobility varied across sub-districts. Private vehicle use dominated weekday travel for nearly two-thirds of residents, particularly men, younger adults, and those in Semper Barat, Pejagalan, and Joglo. Public transport use was higher among women and older residents, especially in Kebagusan and Bambu Apus.

**Figure 14. Frequency of Public Transportation Use (Weekdays)
Base: All respondents (n=622)**

**Frequency of Public Transport
Use (Weekdays)**

Do not use public transport (use private vehicle)	**65%**	2–3 days per week	**0.3%**
1 day per week	**3%**	4–5 days per week	**29%**
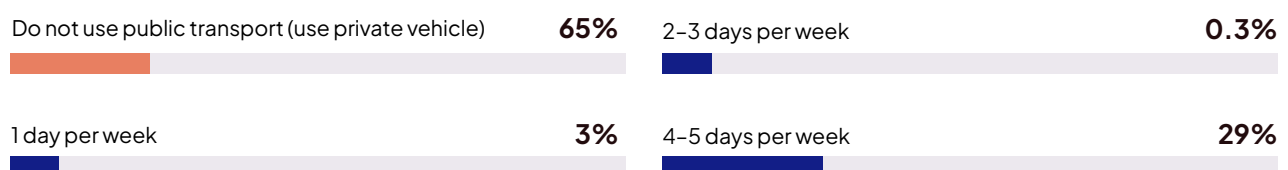
Source: Populix Phase 2 Survey

These shifts reflect not only personal preferences but also structural challenges in Jakarta's transport system. One of the main barriers is the lack of multimodal integration. In Phase 2, 74% of respondents used only one mode of transportation, primarily private vehicles. Only 13% used two modes, and another 13% used three, despite public transportation in Jakarta typically requiring multiple legs: a "first-mile" access mode (walking or motorcycle) from their origin to transit; the main transit (such as TransJakarta or KRL); and a "last-mile" segment (often ride-hailing) from transit to their destination.

This multi-leg journey adds **complexity, cost and time**, which may discourage public transport use, even when options are available.

Gaps in Transport Accessibility

Access to public transport in Jakarta varies considerably by neighborhood. Mikrotrans and cooperative vans are the most accessible, often found within 500 meters of many homes. In contrast, access to TransJakarta stations is more limited, and rail-based services such as MRT, LRT and KRL are rarely within walking distance for most residents. This uneven access reinforces dependency on motorcycles and private cars, particularly in areas underserved by transit networks.

Figure 15. Accessibility of Public Transportation Near Residential Areas

	Not available	0–500 meters	501 meters – 1 kilometer	1–2 kilometers	2–3 kilometers	
Mikrotrans (Angkot)	14%	52%	32%		2%	**76.69%**
Angkot (Cooperative)	10%	43%	14%	24%	9%	**67.68%**
TransJakarta (Busway)	37%	37%	23%		2%	**55.67%**
Metrotrans	35%	19%	13%	24%	10%	**42.77%**
Minitrans	46%	12%	7%	16%	18%	**30.18%**
KRL	68%	12%	6%	13%		**19.05%**
MRT	96%					**2.53%**
LRT	96%	2%				**1.69%**
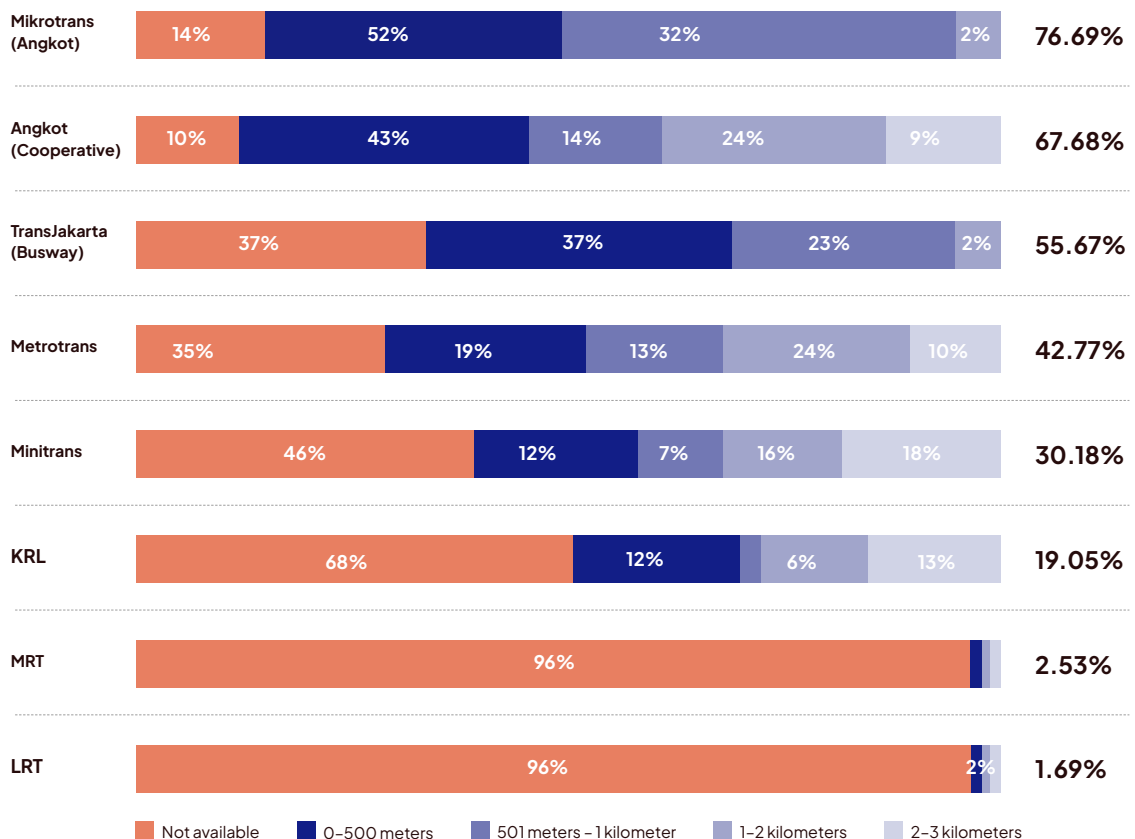
Source: Populix Phase 2 Survey (n=622)

Walking distance tolerance further complicates access. Phase 1 shows that most residents are only willing to walk up to 500 meters to reach a transport point, with a large share preferring even shorter distances. Only a small fraction of residents are willing to walk more than 1 kilometer, while a notable group say they would use a vehicle regardless of the distance. When compared to actual access data from Phase 2, a clear mismatch emerges, especially for high-capacity systems like Busway, MRT, LRT and commuter rail, which are often located beyond these walkable ranges.

Figure 16. Walking Tolerance Distance
Base: All respondents (n=800)

Walking Distance Category

Less than 100 meters **14%**	501 meters – 1 Km **13%**
100 – 200 meters **37%**	More than 1 Km **3%**
201 – 500 meters **25%**	At any distance will take a vehicle **8%**
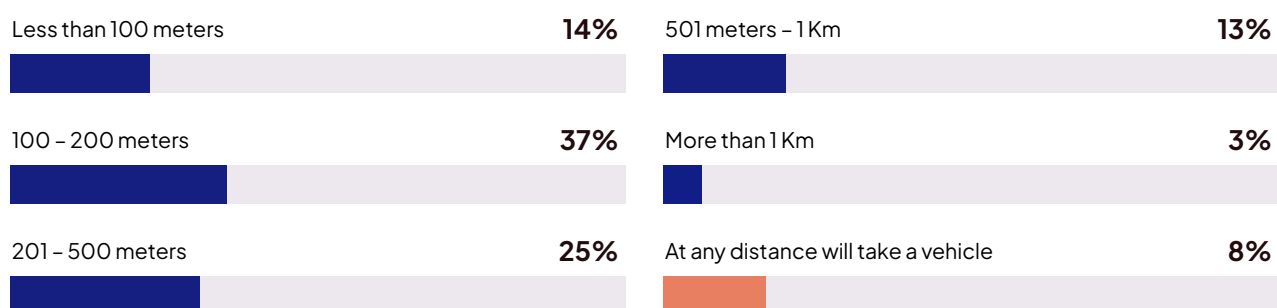
Source: Populix Phase 1 Survey

These findings signal a critical gap in the implementation of transit-oriented development principles. While transit-oriented development aims to promote compact, walkable and mixed-use communities centered on high-quality transit access, Jakarta's current spatial realities show that many residential areas remain disconnected from major transit nodes. The absence of supporting infrastructure such as safe sidewalks, shaded paths, or last-mile connectivity services (e.g., bike-sharing, electric shuttles) further weakens the potential of transit-oriented development.

Key Insights on Transit Accessibility and Mobility Gaps:

- **Many residential areas remain disconnected from major transit nodes, limiting effective access.**

- **Lack of supporting infrastructure (e.g., safe sidewalks, shaded paths, last-mile connectivity) weakens the potential of transit-oriented development.**

- **Less than half of residents walk to access public transport, with many relying on motorcycles or ride-hailing.**

- **Multimodal trips add time, cost, and complexity, reducing public transport's attractiveness.**

- **These barriers risk underutilizing major transport investments and reinforcing private vehicle dependence.**

Without closing the gap between walking tolerance and actual station proximity, the city risks underutilizing its major transport investments and reinforcing private vehicle reliance.

Even when transport is physically available, inefficiencies in the first and last mile segments reduce usability. Less than half of respondents walk to access public transit, while many rely on motorcycle taxis or private vehicles. For the final leg of the journey, a significant portion still uses motorized modes rather than walking, diminishing both the environmental and cost benefits of public transport.

Multimodal trips often require navigating three separate legs, which adds complexity, time and cost. Most respondents avoid such arrangements, opting instead for single-mode travel due to its predictability. These challenges are compounded by poor walking conditions, including limited sidewalks, unsafe crossings, and lack of shade or shelter, particularly in areas inhabited by low-income populations and others at higher risk.

Bridging these gaps requires not only extending coverage, but also strengthening local feeder systems, upgrading walking infrastructure, and improving integration between modes to ensure seamless and accessible travel for all.

Travel Time and Cost Comparison

Private vehicles are widely perceived as faster and cheaper—particularly when people judge costs based only on daily fuel spending. Many users also view public transport as more expensive because of the need for transfers and occasional use of ride-hailing services.

In reality, monthly spending levels are nearly the same: public transport users spend about Rp1.1 million per month (20.5% of Jakarta's minimum wage), while private vehicle users spend around Rp1.2 million (22.2%). When ownership costs such as servicing and tax are included, the gap widens further—raising total expenses to roughly 24% of minimum wage income for motorcycles and 30% for cars.

These findings reveal a common misconception: although private vehicles may seem cheaper due to visible daily expenses, their true financial burden is higher once long-term maintenance and regulatory fees are accounted for. Nevertheless, many residents continue to prefer driving, largely because of perceptions of greater speed, flexibility, and limited access to reliable, integrated public transport.

Motivations and Barriers to Switching

Motivators to switch from private vehicles to public transportation include affordable fares, reliable schedules, shorter travel time, cleanliness and safety. However, many respondents remain reluctant due to inconsistent service, long wait times, lack of real-time information, and the absence of integrated ticketing systems.

Perceptions of service quality shed further light on this hesitation. Public transport facilities are generally rated positively in terms of affordability, accessibility and comfort, but fall short on speed and operational efficiency. Similarly, sidewalks around public transport hubs are viewed favorably, and most respondents agree they are unobstructed and separated from motorized traffic. However, concerns remain regarding lighting, personal safety and accessibility.

These findings suggest that infrastructure alone is not the main constraint. Instead, the overall travel experience, reliability, convenience and continuity play a crucial role in shaping user behavior. Creating a seamless and dignified journey from origin to destination is essential to enabling broader behavior change.

Implications

The success of Jakarta's LEZ policy depends on a mobility system that enables people to shift toward cleaner and more integrated transport options. This requires reducing reliance on motorcycles and private cars for short distances, expanding transit coverage within walkable range, and simplifying multimodal trips.

Infrastructure investments must be matched with institutional coordination, aligning service schedules, pricing, and connectivity across providers. A just and sustainable mobility transition must also be grounded in the everyday realities of Jakarta's residents, particularly those facing constraints of time, affordability and access. Without this user-centered approach, the promise of the LEZ concept as a pathway to better air quality and equity will remain unfulfilled.

3.3.2 Waste Management and Open Burning Practices

While transportation is a major contributor to air pollution in Jakarta, poor waste management, particularly the open burning of household waste, remains a persistent and often overlooked source of local air contaminants. This issue is especially prevalent in areas with limited access to temporary waste disposal sites (TPSs), where burning becomes the default practice. Across both survey phases, respondents recognized the harmful impacts of open burning on air quality, public health and the environment. However, progress remains limited due to persistent behavioral habits, infrastructure gaps and weak enforcement.

> **In the Phase 1 survey, 9% of respondents admitted to practicing open waste burning in their yards—a practice that is prohibited by law in Indonesia. The most common reasons cited were practicality, rapid waste accumulation and lack of nearby TPSs. Although most respondents acknowledged the connection between burning and air pollution, and a large majority supported stricter regulations, actual compliance remains weak due to limited collection services and absence of tangible consequences for burning waste.**

Figure 17. Household Waste Management Practices

How Respondents Manage Daily Household Waste

Picked up by a janitor or garbage truck	83%
Thrown into a landfill (TPS)	56%
Recycled or separated for sale (e.g. plastic, paper, etc.)	21%
Composted at home	13%
Burn in the yard	9%
Buried in the yard	7%
Thrown into a river, gutter, or ditch	3%

Reasons for Burning Trash (n=68)

|	
More practical	60%
Garbage piles up too quickly	59%
No landfill nearby	57%
No garbage collection service around the house	40%
Old habits	37%
Don't know other ways to manage waste	18%
Others	1%

Source: Populix Phase 1 Survey

Phase 2 data from selected sub-districts further reinforce these concerns. Health risks and fire hazards emerged as the most widely recognized impacts of open burning, particularly in Kebagusan, Johar Baru, and Jatinegara Kaum. Yet despite this awareness, access to TPSs remains inadequate. Less than half of respondents (47%) reported having a TPS within 500 meters of their home. In neighborhoods such as Kebagusan and Kebayoran Lama Selatan, most respondents stated that no TPS was available nearby, potentially leading some residents to rely on burning as a fallback option.

Mechanisms for reporting open burning face similar constraints. Although 67% of respondents preferred using a mobile app for reporting open burning, localized channels such as RT/RW remain important, especially in areas with stronger social cohesion like Jatinegara Kaum and Kebayoran Lama Selatan. This suggests that while digital openness is growing, community-based systems still play a central role in environmental enforcement.

However, these systems are not without barriers. Many residents stated they did not know where to report or were discouraged by the lack of follow-up. Socio-economic differences shaped the nature of these barriers. Middle- and upper-income respondents more frequently cited confusion with reporting procedures and system complexity, while lower-income groups expressed concern about interpersonal conflict with neighbors. These findings point to a clear need for reporting systems that are not only user-friendly and well-publicized but also offer anonymity and reliable follow-up.

Household waste sorting practices remain inconsistent. Only half (50%) of respondents reported regularly sorting waste, with the lowest rates found in Joglo, Kebagusan and Johar Baru. Even among those who do sort, most rely on janitors or sanitation workers for further processing, indicating limited integration with downstream waste systems. Composting and reuse practices are emerging, but still concentrated in certain neighborhoods and not yet widespread.

Figure 18. Waste Sorting Habits

Sort Waste **50%**

Do Not Sort Waste **50%**

	Sort Waste	Do Not Sort Waste
Semper Barat	66%	34%
Pejagalan	38%	62%
Tegal Alur	70%	30%
Joglo	33%	67%
Bambu Apus	54%	46%
Jatinegara Kaum	56%	44%
Johar Baru	34%	66%
Kebon Kosong	41%	59%
Kebayoran L Selatan	73%	27%
Kebagusan	34%	66%
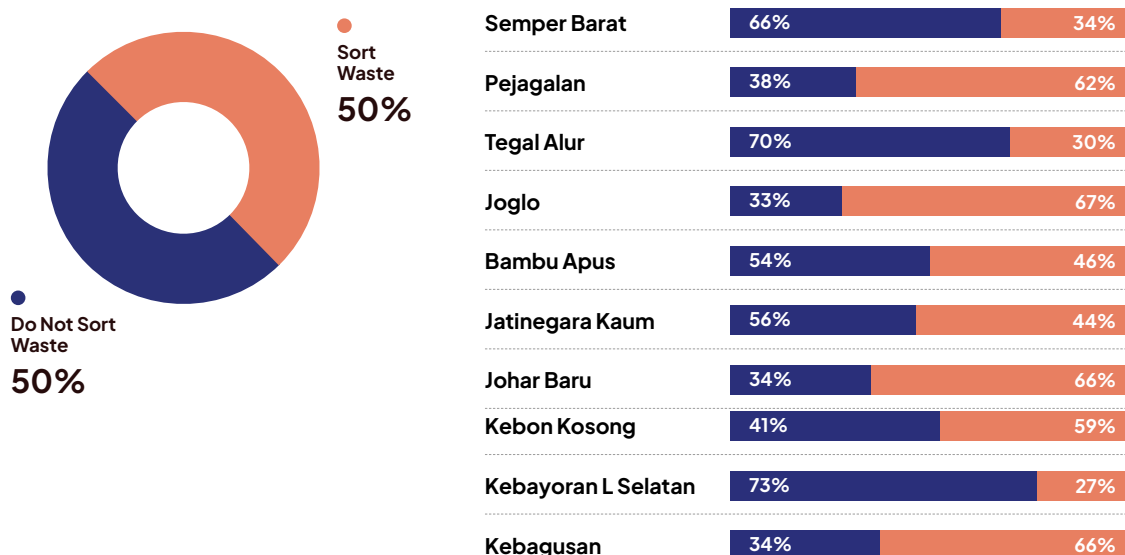
Source: Populix Phase 2 Survey (n=622)

Hazardous and toxic waste, known in Indonesia as B3 (*bahan berbahaya dan racun*), handling also lags. Nearly half of respondents stated they do not dispose of such waste in dedicated facilities. Lack of awareness and unclear access points were the main reasons. Even mid-to-upper socioeconomic groups in Pejagalan and Joglo reported confusion about B3 disposal procedures, highlighting that knowledge gaps are not confined to lower-income communities.

Altogether, these findings reinforce that waste-related behavior is not simply a matter of personal responsibility: It is shaped by access to infrastructure, clarity in enforcement, and socioeconomic conditions. Improving public compliance will require:

- Expanding TPS coverage and improving site cleanliness and accessibility.

- Strengthening public communication and digital reporting tools.

- Providing clear, accessible alternatives for hazardous waste and composting.

- Supporting post-sorting systems through localized hubs such as waste banks and compost centers.

Unless these waste management challenges are addressed, implementation of the LEZ concept will remain undermined. Clean air strategies must integrate waste reform, or risk overlooking a critical source of neighborhood-level pollution.

3.3.3 Access and Use of Green Open Spaces

Green open spaces are a vital pillar of Jakarta's low emission zone (LEZ) implementation plan strategy. Beyond their role in improving air quality and reducing urban heat, these spaces also function as essential infrastructure for public health, social interaction, and environmental resilience. However, access and use remain highly unequal across neighborhoods.

Unequal Access to Green Open Spaces (RTH) Across Sub-Districts

Only 23% of respondents reported having a green open space near their residence, with stark differences between sub-districts. In Semper Barat, the majority had access, while in Pejagalan, Tegal Alur and Kebagusan, none of the respondents reported such access. Participation in climate programs like ProKlim also made a difference—51% of residents in ProKlim areas reported nearby green spaces, compared to only 8% in non-ProKlim areas.

Figure 19. Availability of Green Open Spaces (RTH) (within 500 meters)

Available **23%**

Not Available **77%**

Sub-District	Available	Not Available
Semper Barat	81%	19%
Pejagalan		100%
Tegal Alur		100%
Joglo	33%	67%
Bambu Apus	33%	67%
Jatinegara Kaum	32%	68%
Johar Baru	11%	89%
Kebon Kosong	28%	72%
Kebayoran L Selatan	17%	83%
Kebagusan		100%
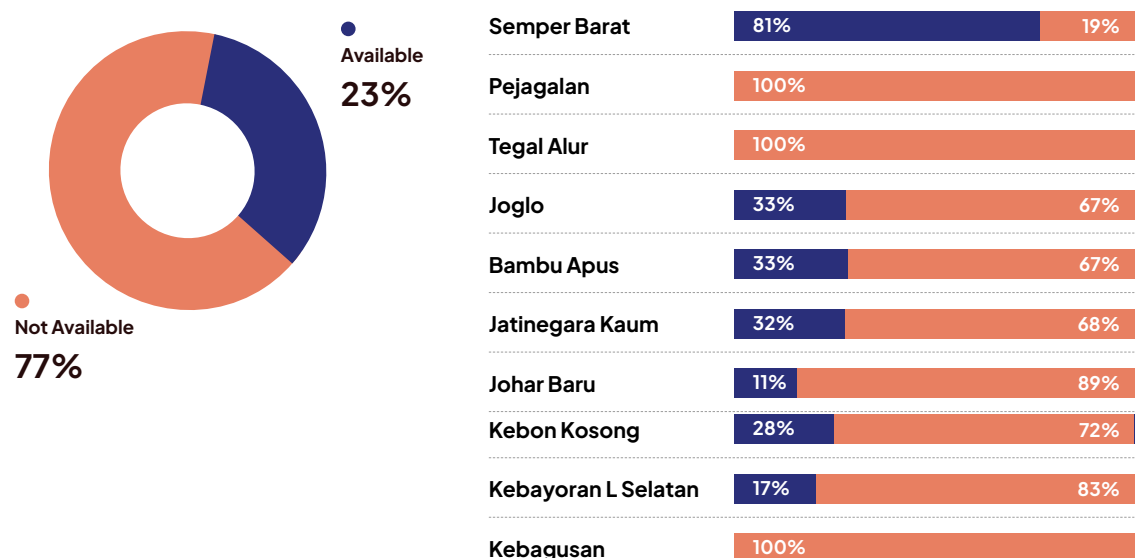
Source: Populix Phase 2 Survey (n=622)

Among those with access, nearly all had visited a green open space in the past three months. However, only a small share reported using it consistently, suggesting other limiting factors such as perceived comfort, safety or lack of programming.

Figure 20. Areas for Improvement in Local Green Open Spaces
Base: Respondents with Green Open Spaces (RTH) near their residence (n=141)

Aspects

Aspect	%	Aspect	%
Low community participation in maintaining the RTH	**62%**	Lack of community programs or activities involving RTH	**32%**
Lack of public facilities (seating, pathways, lighting)	**51%**	Insufficient number of plants or trees	**28%**
Absence of clear rules/supervision for RTH usage	**50%**	Poor cleanliness (e.g., visible trash in the area)	**28%**
Poor maintenance of plants and trees	**40%**	Difficult or uncomfortable access to RTH	**10%**

Source: Populix Phase 2 Survey

The most common concern was low community participation in maintenance. Many respondents also noted the lack of amenities like seating, pathways or lighting, and difficulties in reaching the space comfortably—especially in Kebayoran Lama Selatan, where limited access was also noted during interviews.

Home Gardening as a Complementary Space

For many Jakarta residents, especially those living in densely packed neighborhoods and narrow alleyways, home gardening is not a practical option. Nearly half of respondents reported having no planting space at all, with the issue most prominent in areas like Semper Barat and Joglo. Even when some space is available, it is often limited to narrow strips or pots in front of the house, restricting the potential for meaningful greening.

Figure 21. Availability of Gardening Space

Availability of Gardening Space

Yes, but only enough for small or potted plants	**50%**	Yes, enough to grow trees or large plants	**6%**	No space or area available for planting	**44%**
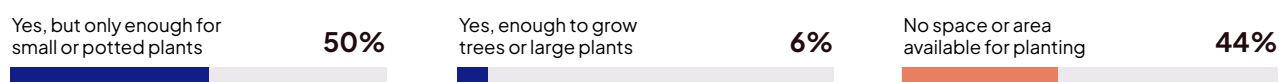
Source: Populix Phase 2 Survey

Among those who do engage in home gardening, the activity is largely ornamental. Functional uses such as growing vegetables or planting shade trees remain uncommon. This reflects not only spatial constraints but also the absence of targeted support or guidance. These findings suggest that while household greening could serve as a useful complement to public green spaces, it should not be expected to play a major role in areas where land scarcity shapes everyday life. Programs to promote home gardening or community green spaces must be context-sensitive and avoid assuming that all households have equal capacity to participate.

Implications

The lack of equitable access to green open spaces—both public and private—limits Jakarta's ability to build a fair and resilient urban environment. For communities with higher air pollution exposure, the absence of greenery compounds exposure to pollution and reduces opportunities for adaptation and climate co-benefits. Addressing this gap is critical so that the environmental benefits of the LEZ strategy are widely shared across the city.

3.3.4 Energy Practices Shaping Urban Air

Energy usage behavior is a critical component of Jakarta's clean air transition, yet remains under-addressed in daily practices. Phase 2 findings reveal that while awareness exists, energy efficiency is not yet embedded as a habit at either the household or community level. Moreover, informal microenterprises continue to rely on polluting fuels, contributing significantly to local emissions that are often excluded from formal policy frameworks.

Household Electricity Use

Most households in Jakarta own a wide range of electronic appliances, with fans and televisions being the most common. While respondents generally understand the importance of conserving electricity, this awareness does not always translate into consistent behavior. Air conditioners and ovens are more likely to be turned off when not in use, likely due to their perceived electricity cost. In contrast, devices used more frequently, like fans and televisions, are often left running unnecessarily.

Survey data shows that more than 85% of respondents claim to always turn off air conditioners when not in use, but only around three-quarters do the same for televisions and fans. A notable share, around 12% to 14%, admit to never switching them off, even when idle.

This pattern illustrates a selective application of energy-saving behavior. People tend to act when the perceived impact on their electricity bill is high, but often neglect everyday actions that, if adopted citywide, could yield substantial environmental benefits. Public campaigns should not focus solely on large infrastructure or device upgrades, but also on reinforcing simple habits that are repeated daily. These small, consistent actions have the potential to produce large-scale impact when adopted collectively.

Energy-Efficient Purchasing Behavior

Despite rising awareness about sustainability, most consumers still prioritize durability and price when purchasing home electronics. Energy efficiency and eco-labels are often overlooked. Only a small fraction, around 6%, say they consistently consider energy-saving features when making purchases. In contrast, more than one-third report never considering such factors at all.

There is, however, latent willingness to shift behavior. When asked whether they would buy energy-efficient appliances even if slightly more expensive, 60% of respondents said yes and another 35% said maybe. Yet this openness is not evenly distributed. Among higher-income groups, nearly all expressed willingness, while among lower-income respondents, fewer than one in three were receptive to the idea.

These disparities point to two major challenges. First is the low visibility and perceived importance of energy efficiency during purchase decisions. Second is the affordability barrier, which makes sustainable consumption largely inaccessible to lower-income households. Addressing both requires a dual approach: communication campaigns that elevate the value of energy-efficient choices, and financial mechanisms, such as rebates or installment schemes, that reduce entry costs.

Charcoal Use in Culinary Micro, Small and Medium Enterprises (MSMEs)

One of the most concerning findings relates to the widespread use of charcoal by culinary micro, small and medium enterprises (MSMEs). Almost all respondents in this category still use charcoal as their main cooking fuel. This practice is particularly concentrated in dense areas such as Johar Baru and Jatinegara Kaum, where cooking is often done in semi-open or unventilated spaces.

Figure 22. Types of Fuel Used in Culinary MSMEs
Base: Culinary MSMEs (n=75)

Type of Fuel Used for Cooking

Charcoal	**96%**	Kerosene	**29%**
Firewood	**31%**	LPG	**7%**
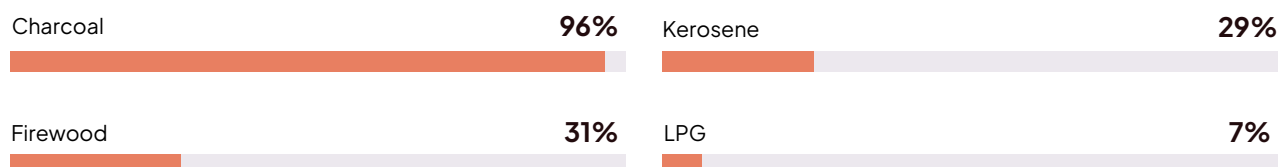
Source: Populix Phase 2 Survey

The choice of charcoal is driven primarily by cost. It is cheaper than liquified petroleum gas (LPG) and provides steady, reliable heat for long cooking durations. For small vendors operating with thin profit margins, charcoal allows them to remain economically viable. This cost-based logic is not limited to culinary MSMEs. Informal home-based industries, such as tempe and tofu production, also rely heavily on charcoal for the same reason. Transitioning to LPG is often seen as economically infeasible, as it would reduce their already limited profit margins.

Despite their clear contribution to local air pollution, these businesses are rarely included in emission control policies. Their operations fall outside formal regulation, highlighting the need for tailored technical assistance and capacity-building programs to help informal operators adopt cleaner and more efficient production practices.

Survey results show that operators of culinary MSMEs are split in their views on the potential regulation limiting high smoke-emitting fuels. While a slight majority (56%) express some level of agreement, nearly half remain resistant or undecided. This divided stance suggests that acceptance is far from universal and points to lingering concerns about feasibility and impact on livelihoods.

Figure 23. Culinary MSME Response Toward Smoke-Fuel Regulation

Acceptance of 'Potential Regulation' on High Smoke-Emitting Fuels for Culinary Businesses

| | Agree (T3B) 56% | Disagree (B3B) 44% | Mean Score 3.68 / 6.00 |

6 Strongly agree	5	4	3	2	1 Strongly disagree
	25%	32%	32%	12%	

Adaptation Strategies if the Regulation is Enforced

Strategy	%
Use smoke-reducing technologies (e.g., smoke filters)	53%
Switch to alternative fuels (e.g., gas, electricity, biogas)	47%
Relocate business to areas not affected by the regulation	21%
Reduce charcoal use frequency	19%
Apply for exemption or special permits	16%
Make no changes and continue using the same fuel	14%

Source: Populix Phase 2 Survey

In terms of adaptation, the most preferred strategies include adopting smoke-reducing technologies like filters and switching to cleaner fuels such as gas or electricity. However, a notable share, around 14%, indicate they would make no changes at all, choosing to continue with the same fuel regardless of regulation. This underscores the need for targeted outreach, financial support, and practical alternatives that align with the economic realities faced by small-scale vendors.

Implications

- Energy-saving behavior needs to be integrated into daily routines, not treated as a one-time change.

- Financial incentives and support are necessary to make clean appliances and fuels accessible to lower-income households and microenterprises.

- Emissions from informal sectors such as street food vendors and home industries must be acknowledged and addressed in clean air strategies.

- Policymakers must consider the economic realities that shape fuel choices in order to design fair and feasible interventions.

Jakarta's clean air goals cannot be achieved by focusing only on transport and waste. The energy choices people make every day, both in their homes and their businesses, have a direct and lasting impact on neighborhood air quality. Addressing these practices is essential for a transition that is not only technically sound but also inclusive and sustainable.

3.4 Communication Channels and Local Influencers

Effective communication is essential for public understanding, acceptance and behavior change in support of air quality initiatives such as the LEZ. Findings from the Phase 2 survey show that the success of outreach strategies relies not only on the message itself but also on how it is delivered, who delivers it, and whether it fits local social dynamics.

Figure 24. Preferred Sources of Information in the Neighborhood

Acceptance of 'Potential Regulation' on High Smoke-Emitting Fuels for Culinary Businesses

	All respondents (n=622)	Gen-Z (n=140)	Millennials (n=200)	Gen-X & Boomers (n=282)
Community meetings or face-to-face discussions	64%	55%	64%	68%
WhatsApp group	58%	59%	61%	56%
Social/community events (e.g., religious events, clean-ups)	55%	53%	59%	54%
Loudspeaker announcements (mosques/musholla)	46%	58%	42%	44%
Notice boards at RT/RW posts	43%	46%	45%	40%
Door-to-door visits	32%	21%	35%	36%
Leaflets or brochures	32%	31%	24%	38%
Posters or banners in the neighborhood	15%	15%	12%	17%
Social media (Facebook groups, Telegram, etc.)	1%	1%	2%	2%

Source: Populix Phase 2 Survey

Across the 10 study areas, face-to-face communication was consistently ranked as the most preferred channel for receiving environmental information, favored by 64% of respondents. This format was especially dominant in Pejagalan (100%), Joglo (95%) and Semper Barat (84%), areas where strong neighborhood ties and local leadership structures remain central to everyday information exchange. WhatsApp groups (58%) and religious or community events (55%) were also popular, underlining the role of familiar, relational and recurring forms of communication.

Digital channels like social media or posters, while frequently used for news, ranked lowest in terms of trust and preference for environmental information. Only 1% of respondents preferred receiving environmental updates through Facebook groups or Telegram channels. This indicates that while digital platforms may be pervasive, they are not yet seen as effective for behavior-change communication at the neighborhood level.

In terms of figures with influence, the most listened-to actor by far was the RT/RW head (96%), and three out of four respondents (76%) cited them as the most active in promoting environmental issues. Religious leaders were also frequently mentioned (50%), although only 5% considered them to play an active role in environmental advocacy, suggesting a gap between visibility and leadership on this issue. Traditional leaders and local community figures also showed localized influence, particularly in areas with strong 'adat' (customary law and traditional norms in Indonesia) or long-established communal structures."

**Figure 25. Trusted Figures at the Neighborhood Level
Base: All respondents (n=622)**

Legend:
■ Figure People Listen to
■ Figure Considered Most Active in Promoting Environmental Issues

Figure	Listen to	Most Active
RT/RW Head	96%	76%
Religious Leaders	50%	5%
Traditional Leaders	41%	10%
Local Community Leaders	19%	7%
Environmental / Social Activists	18%	3%
Academics (lecturers/teachers)	1%	0.5%
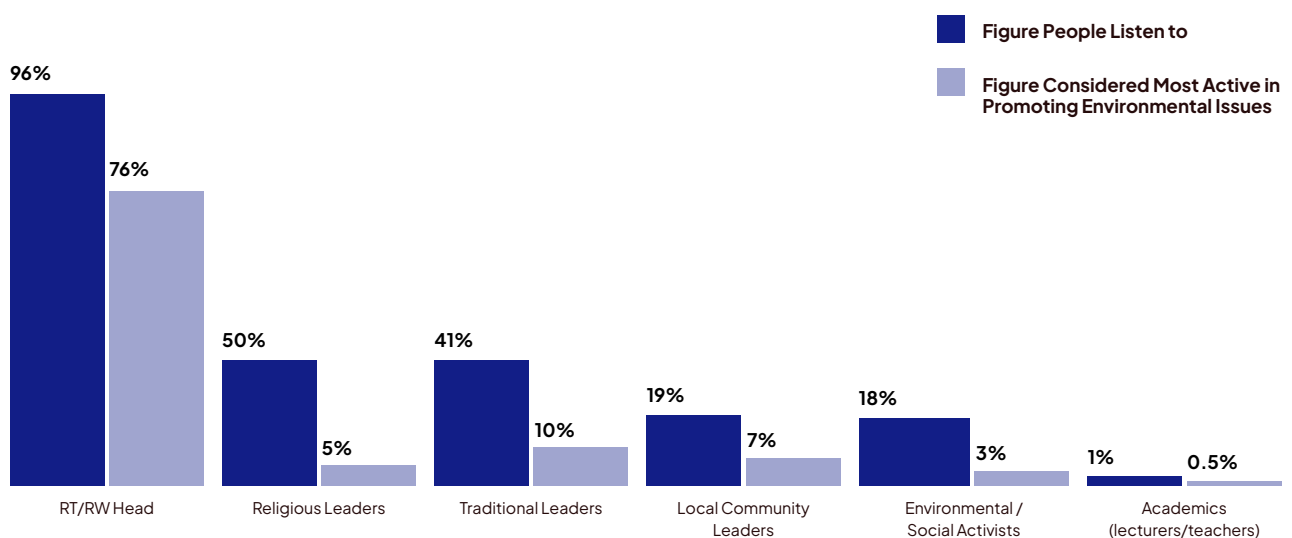
Source: Populix Phase 2 Survey

Community organizations play a complementary role. Groups such as PKK, Karang Taruna and RT/RW-based community forums were cited as active in several sub-districts, though visibility varies. For instance, PKK was highly visible in Bambu Apus (93%) but nearly absent in Kebagusan and Johar Baru, pointing to uneven community infrastructure. Meanwhile, waste-focused organizations like waste banks or clean-up groups were more prevalent in Jatinegara Kaum, Kebagusan and Kebon Kosong, potentially providing a localized entry point for LEZ socialization.

These findings highlight several key takeaways for the LEZ implementation plan communication strategy:

- Trust is local: Messages delivered through interpersonal and familiar actors, like RT/RW or WhatsApp group admins, are more likely to be received, understood and acted upon.

- Context matters: Communication approaches must be adapted to local characteristics. What works in Semper Barat or Joglo may not work in Kebagusan or Johar Baru.

- Not all visible figures are mobilizers. For example, high exposure to religious leaders doesn't guarantee engagement unless they are actively involved in environmental messaging.

To facilitate uptake and equity, LEZ outreach should prioritize hyperlocal delivery mechanisms, leverage socially trusted figures, and recognize the diversity in communication ecosystems across Jakarta's neighborhoods.

CHAPTER IV

Recommendations

To support a more inclusive and equitable shift toward cleaner air in Jakarta, policy efforts must move beyond fragmented and sectoral regulatory instruments and be grounded in a systems-level understanding of how people perceive, adapt to, and are constrained by environmental challenges. Drawing from both Phase 1 (Perception Survey) and Phase 2 (Distributional Impact Study), this chapter outlines strategic directions based on the concept of the low emission zone (LEZ) implementation plan, which serves as a holistic and community-centered approach that emphasizes localized engagement, shared responsibility and structural support.

This framework uses the knowledge, attitude and practice (KAP) model, supported by the integrative public policy acceptance (IPAC) dimensions, to inform three primary levers for change: advocacy, capacity development and policy alignment. Together, these components provide a road map for shifting fragmented awareness into collective and sustained behavioral change, especially in communities that have historically been underserved by environmental interventions.

Figure 26. Recommendations Using the KAP Framework

KNOWLEDGE

In both phases, most respondents were aware that air pollution is a serious urban issue, with vehicle emissions and open burning identified as the main causes.

However, understanding of mitigation mechanisms like LEZ and ERP remains limited, especially in non-ProKlim areas.

Phase 2 shows that ProKlim residents demonstrated higher environmental literacy and recognition of local air pollution sources (e.g., roadside vendors, cigarette smoke) compared to residents in non-ProKlim areas.

ATTITUDE

Most respondents expressed strong concern about air pollution, but perceived individual actions as having a limited impact compared to industrial or governmental responsibilities.

Public acceptance of LEZ and ERP policies and their local implementation was mixed; while many agreed with the objectives, there was skepticism about fairness and enforcement, especially among informal and low-income workers.

Residents in ProKlim areas showed higher trust in community-driven initiatives and stronger motivation when air quality improvements were linked to tangible benefits such as better health and safer neighborhoods.

PRACTICE

Adoption of clean air practices, such as mask wearing or reducing outdoor activity during high pollution days, remains inconsistent and reactive.

Public transport use is relatively low, with motorcycles dominating daily travel, particularly among men and lower-income groups.

Clean air practices like waste sorting and composting are more common in ProKlim areas but remain limited in non-ProKlim neighborhoods.

Affordability continues to be a major barrier to adopting cleaner fuels and efficient appliances, particularly among MSMEs.

ADVOCACY

Advocacy for Knowledge:
- Localize air pollution messages using health risks relevant to daily life (e.g., vehicle fumes, child asthma, fatigue in outdoor workers).
- Replicate ProKlim's educational models in non-ProKlim areas through RT/RW-based outreach and family-centered education (e.g., via PKK).
- Normalize clean behavior by highlighting individual impact (e.g., proper waste sorting, choosing non-motorized transport).
- Visualize daily exposure through interactive materials (e.g., infographics on local sources of pollution in each sub-district).

Advocacy for Attitude:
- Frame the LEZ implementation plan as a public good, not merely a restriction, by emphasizing co-benefits such as better health, safer neighborhoods, and reduced illness.
- Use testimonials and personal stories from affected groups (e.g., outdoor workers, MSMEs) to build empathy and strengthen trust in policy goals.
- Reinforce public motivation through positive framing, such as highlighting that most Jakartans support clean air initiatives and share shared responsibility.
- Address skepticism about fairness and enforcement by improving clarity and transparency in communication, especially for informal and low-income groups.
- Link clean air messages to values people care about, such as family health, religious duty, and neighborhood pride, to make policy benefits more relatable.

CAPACITY DEVELOPMENT

Prioritize non-ProKlim areas for environmental education and behavior change programs.

Build local forums (RT/RW, PKK, Karang Taruna) to co-create adaptive practices for vulnerable occupations such as street vendors and ojek drivers.

Equip local cadres and ProKlim facilitators as information relays and motivators.

Support MSMEs in adopting cleaner fuels through practical training on alternatives and smoke-reducing technologies.

POLICY & LAW ENFORCEMENT

Clarify enforcement mechanisms at the community level, as many residents remain unclear about how LEZ rules apply locally.

Ensure LEZ implementation plans are accompanied by affordable, viable transport alternatives, especially in underserved areas.

Protect vulnerable groups through targeted exemptions, subsidies, or phased implementation.

Address informal emission sources (e.g., food stalls using charcoal) with incentive-based regulation and cleaner alternatives.

EXTERNAL BARRIER

- Informal workers relying on old vehicles face limited alternatives, especially in areas lacking affordable transport or clear policy support.
- Access to waste disposal, sidewalks, and green spaces remains unequal across the city, limiting the ability of residents to adopt cleaner daily practices.
- High cost and low availability of energy-efficient appliances and fuels hinder low-income households and MSMEs from transitioning to greener practices.

Campaigns that can be chosen:

- Instagram for Gen Z and Millennials
- WhatsApp Groups in community-driven areas
- Television for Gen X and Boomers
- Online news portals for professionals
- RT/RW channels in ProKlim areas
- Outdoor media in high-traffic zones

4.1 Knowledge

Awareness of air pollution as a serious urban issue is already widespread across Jakarta. Most respondents in both phases correctly identified key contributors such as vehicle emissions and open waste burning. However, Phase 2 reveals that recognition of localized pollution sources such as food vendors using charcoal or cigarette smoke in residential alleys is far more common in ProKlim areas. This suggests that proximity to environmental programs significantly shapes how people define and interpret pollution.

In non-ProKlim areas, knowledge tends to be generic and disconnected from practical response. Residents may be aware of pollution in abstract terms but lack exposure to actionable information or community dialogues that contextualize the issue. Improving knowledge is therefore not just about increasing information access but also embedding air quality narratives into hyperlocal contexts that reflect the daily lived realities of each neighborhood.

4.2 Attitude

Attitudes toward clean air efforts are generally positive but vary in depth and consistency. Respondents in ProKlim neighborhoods express stronger alignment between environmental concern and a sense of shared responsibility. This likely stems from sustained engagement through local initiatives that position clean air as a matter of communal value and routine practice rather than individual burden.

In contrast, attitudes in non-ProKlim areas often reflect a sense of detachment or skepticism. Economic vulnerability and limited access to alternative options appear to drive doubts about the feasibility of change. Many do not reject clean air goals outright but struggle to see how these goals align with their constraints. Emotional framing that connects clean air with health, family well-being and neighborhood pride is needed to shift attitudes from passive agreement to personal relevance.

4.3 Practice

Behavioral change remains the most fragile link in the clean air transition. Even among those who are well-informed and supportive, practices such as mask use during pollution events or reduced outdoor activity tend to be situational rather than habitual. The use of motorcycles as the dominant mode of transport persists across all income groups, and public transport remains underutilized, especially in peripheral or underserved areas.

Phase 2 findings show that ProKlim residents are more likely to adopt multiple clean air practices simultaneously, including composting, energy-saving and proper waste sorting. These behaviors are not driven by awareness alone but also by programmatic support, community pressure and infrastructural access. In non-ProKlim areas, the absence of these enablers often means clean air behaviors are perceived as costly, inconvenient or unattainable. Bridging this gap requires making clean air practices easier, cheaper and more visible in everyday life.

4.4 Action Steps

To bridge the gap between awareness and action, the study recommends three integrated strategies:

Advocacy

Advocacy efforts should move away from abstract appeals and focus on messages that reflect the daily stakes of poor air quality. Health impacts like child asthma, fatigue in outdoor workers, or sleep disturbance are powerful anchors for messaging. Using stories from relatable figures such as ojek drivers, PKK members, or neighborhood leaders can humanize clean air as something urgent and relevant rather than distant or elite-driven.

Equally important is shifting the perception of clean behavior from personal sacrifice to community norm. Campaigns should normalize practices like waste sorting or walking short distances by linking them to pride, faith and care for others. Visual tools such as neighborhood-specific infographics can help people see the pollution around them and recognize their role in either contributing to or reducing it. Advocacy should prioritize non-ProKlim areas where skepticism and detachment remain high.

Capacity Development

Capacity development must begin by recognizing the existing social infrastructure within neighborhoods. Forums like RT and RW, PKK and Karang Taruna are often trusted spaces where dialogue and behavioral modeling can occur. Strengthening these platforms to support clean air actions enables behavioral change to be locally led and responsive to community needs. ProKlim facilitators, waste bank volunteers and informal community leaders can serve as consistent and credible messengers.

For groups most affected by pollution, such as street vendors or MSMEs, capacity development should include direct support in transitioning to cleaner practices. This includes hands-on training, affordable alternatives and access to safer technologies. Without this support, clean air actions will remain inaccessible to the very communities that need them most. Equipping local actors with tools, trust and technical knowledge is essential for scaling low emission zone (LEZ) principles in a fair and grounded way.

Policy & Law Enforcement

Findings from Phase 2 indicate that many residents remain unclear about how air quality policies translate into everyday expectations and responsibilities. This uncertainty is especially common in non-ProKlim areas, where exposure to formal communication channels and environmental governance is limited. Without clear explanation of rules, timelines, or consequences, policy enforcement risks being perceived as arbitrary or unfair. Clarity and consistency in messaging are critical so that policy expectations are both understood and seen as legitimate.

Policy enforcement must also be accompanied by viable alternatives. The ability to comply with clean air expectations is heavily shaped by structural access to infrastructure such as affordable public transportation, accessible waste disposal points and functional green spaces. Where these enablers are missing, enforcement alone will not drive compliance. This is especially critical in peripheral neighborhoods like Tegal Alur, Pejagalan and Kebagusan, where residents often lack realistic options to reduce emissions or modify mobility patterns.

CHAPTER V

Conclusion

Jakarta's effort to improve air quality through the LEZ concept signals an important shift toward a more holistic and inclusive environmental agenda. This concept moves beyond traditional top-down regulation by acknowledging that clean air is not only a technical or legal matter, but also a deeply social and structural issue. It requires attention to everyday behaviors, community infrastructure, and the lived experiences of those most affected by pollution.

Findings from the two research phases show that public concern about air pollution is high across demographic groups. Many residents recognize vehicle emissions, open waste burning and industrial activity as major contributors to poor air quality. However, this awareness does not always translate into consistent or preventive action. Especially among people at higher risk of harms from air pollution, such as older adults, people with disabilities, outdoor workers and residents in low-income areas, adaptive behavior is constrained by systemic limitations. These include unreliable public transport options, limited access to nearby waste disposal points, and the absence of safe green spaces.

The study also reveals that public understanding of government interventions remains partial. While many respondents are aware of policies such as LEZ, ERP, or vehicle age restrictions, fewer are able to explain how these measures work or what responsibilities they entail. Misconceptions are widespread, and technical terms are often misunderstood. This lack of clarity weakens the foundation for meaningful engagement and increases the risk that clean air initiatives will be perceived as arbitrary or inaccessible.

Behavioral change is further shaped by everyday structural realities. Many residents rely on motorcycles or older vehicles not by choice, but due to gaps in public transport connectivity, cost concerns and lack of pedestrian infrastructure. Waste sorting and energy-efficient practices are adopted inconsistently, largely because of limited infrastructure or insufficient follow-up at the community level. The challenge is not a lack of willingness, but a lack of enabling conditions that make clean air practices viable and routine.

Communication and local leadership emerge as central factors in the success or failure of clean air messaging. Trusted neighborhood figures such as RT and RW leaders, community groups like PKK or Karang Taruna, and WhatsApp networks play a decisive role in how information is received, trusted and acted upon. In many sub-districts, especially those with limited formal outreach, these interpersonal channels are the backbone of environmental engagement. However, their capacity varies widely and requires strategic support to achieve consistency and reach.

In short, the transition toward cleaner air in Jakarta must be grounded in the daily realities of its residents. The LEZ concept holds promise, but only if it is implemented with an understanding of social constraints, infrastructural inequalities and trust dynamics at the local level. This study demonstrates that support for clean air is already present, but action will only follow if people are given the tools, information and opportunities to participate meaningfully. Bridging the gap between knowledge and practice, between aspiration and access, is the next essential step in Jakarta's clean air journey.

Citations

Badan Pusat Statistik. (2020). *Klasifikasi generasi: Pengelompokan berdasarkan tahun kelahiran (Generasi Z, Milenial, Generasi X, Boomer).* Sensus Penduduk 2020. Retrieved from **https://sensus.bps.go.id/topik/tabular/sp2020/2/0/0**

Grelle, S., & Hofmann, W. (2024). *When and why do people accept public-policy interventions? An integrative public-policy-acceptance framework. Perspectives on Psychological Science, 19*(1), 258–279.

Indonesian National Police. (2023, August 17). *Motor vehicle registration data in DKI Jakarta.* Jakarta: Traffic Corps (Korlantas), Indonesian National Police. [Unpublished internal data].

IQAir. (2024). *Jakarta Air Quality Index (AQI) and PM2.5 Air Pollution Report.* Retrieved from https://www.iqair.com/us/indonesia/jakarta/jakarta

Jakarta Smart City. (2021). *Zona Rendah Emisi untuk Kota Tua yang Bebas Polusi.* Retrieved from https://smartcity.jakarta.go.id/id/blog/zona-rendah-emisi-untuk-kota-tua-yang-bebas-polusi/

Launiala, A. (2009). *How much can a KAP survey tell us about people's knowledge, attitudes and practices?* Anthropological Notebooks, 15(1), 19–32.

Nemesis, C. (2024, May 5). *Meluruskan definisi LEZ di Indonesia.* ITDP Indonesia. https://itdp-indonesia.org/2024/05/meluruskan-definisi-lez-di-indonesia/

Vital Strategies & Institut Teknologi Bandung. (2022). *Identifying the main sources of air pollution in Jakarta: A source apportionment study* [Policy brief]. https://www.vitalstrategies.org/wp-content/uploads/Air-Pollution-in-Jakarta-A-Source-Apportionment-Study_Policy-Brief_