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# Is NIMBY inevitable? An empirical exploration of determinants of public attitudes towards unwanted facilities using nationally representative data in China

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## ABSTRACT

'Not in my Back Yard' (NIMBY) protests against the construction of unwanted facilities nearby occur when individuals prioritize personal benefits over broader social benefits, which is an interesting phenomenon in China's government-regulated market economic system. Although this fascinating phenomenon attracts plenty of research attention, it remains unknown regarding the extent of NIMBY intention and its influencing factors in China. This study describes the NIMBY intention of Chinese residents towards a large-scale chemical plant with low pollution and analyzes its determinants utilizing data from a nationally representative survey in 2017. It shows that 85% of the 38,775 respondents have strong NIMBY intentions. Among all factors, education and urbanization are the two most influential ones and are positively related to NIMBY intention. Besides, women, high-income groups, and people living in areas with strong social networks, high GDP per capita, or high pollution, exhibit strong NIMBY intention. Conversely, trust in the government and willingness to participate in public affairs are negatively correlated with NIMBY intention. Our study indicates that NIMBY intention will inevitably rise with educational attainment and urbanization levels, but the NIMBY dilemma can be alleviated by implementing participatory governance and building trust in local government.

## KEYWORDS

NIMBY intention; determinants; pollution; governance; China

## JEL CLASSIFICATION

O18; Q56; Q58; R14

## I. Introduction

The 'Not in my Back Yard' (NIMBY) phenomenon generally refers to community groups' objection to building unwanted facilities in their neighbourhood (Dear 1992). While initially observed mainly in developed countries, the past two decades have seen a rise in NIMBY movements in developing countries like China. Significant cases in China include protests against the paraxylene (PX) plant in Xiamen in 2007, the Asuwei waste incineration plant in Beijing in 2009, and the molybdenum and copper smelter in Shifang in 2012 (Wan and Wang 2019). These movements have garnered much research attention regarding the formation, evolution, and management strategies (Gu 2016; Johnson 2010, 2013; Lang and Xu 2013; Lu et al. 2019).

China's unique economic system underscores the importance of research on NIMBY issues. Firstly, China's economy, characterized by government-regulated and collective-oriented, places an

emphasis on societal interests (Earley 1989). Within this context, understanding the presence and impact of NIMBYism which favours individual benefits over social welfare becomes crucial. Secondly, China's fast-paced economic and urban growth has resulted in many infrastructure and industrial projects being constructed nationwide, with the government adopting a land expropriation and resident compensation model (Gyourko et al. 2022). This approach has heightened land use concerns among residents, exacerbated by the differing urban and rural land systems (Zhou, Li, and Liu 2020). Finally, the goal of maintaining social stability and harmony drives policymakers to closely examine NIMBYism, seeking solutions that reconcile individual concerns with broader community welfare (Gu 2016; Sun et al. 2016).

Although NIMBY movements have attracted much research attention, a close examination of the literature reveals at least three potential gaps. First, research on NIMBY typically focuses on

the last stage of NIMBY movements and provides suggestions for conflict governance (Johnson 2010, 2013; Lang and Xu 2013; Lu et al. 2019; Zheng and Liu 2018), rather than the initial stage of NIMBY movements, i.e. NIMBY intention. As NIMBY movements are the manifestations of individual NIMBY intentions following organization and mobilization, it is crucial to understand the determinants of individuals' initial NIMBY intention, which form the basis of NIMBY movements. This is especially the case when understanding this mechanism could provide ex-ante solutions that alleviate policymakers' dilemmas.

Second, the mainstream literature on NIMBY in China has widely used case study approaches (Johnson 2013; Li et al. 2019; Sun et al. 2016). These studies effectively document specific events and provide an in-depth analysis of the mechanisms of influence, but their context-specific findings limit generalizability. In China, gauging the strength and evolution of NIMBY intentions amid economic development remains a question.

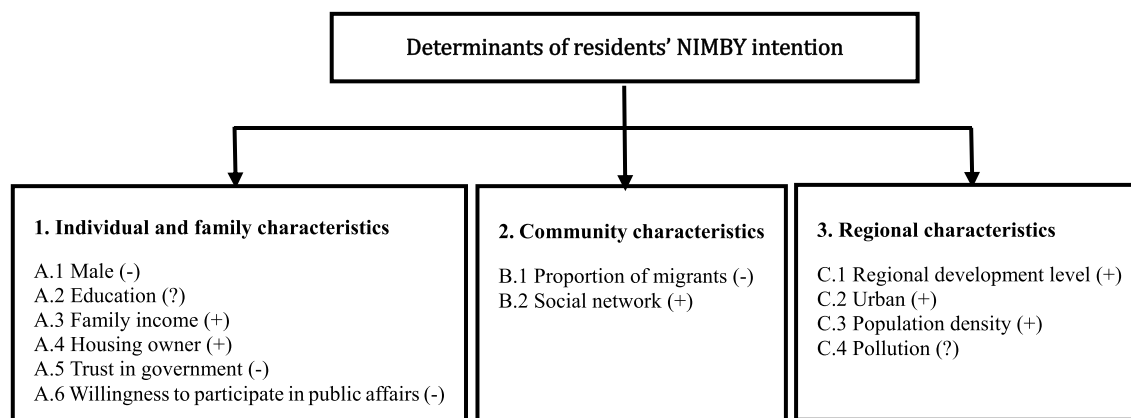
Thirdly, studies on NIMBY intentions mainly examine individual traits like social backgrounds and psychological attributes (Kraft and Clary 1991; Krannich and Albrecht 1995), with fewer studies addressing external factors, such as population density, regional development, and environmental pollution, due to the inadequacy of localized surveys (Johnson 2010; Lang and Xu 2013). These external factors are essential as

they influence community attitudes, resource allocation conflicts, and policy effectiveness.

To fill these research gaps, this study leverages data from a nationally representative household survey in China to investigate the NIMBY attitudes of Chinese residents towards a low-pollution large-scale chemical plant. Then, we introduce a conceptual framework and hypothesize the roles of individual, community, and regional factors in shaping NIMBY intentions. This research makes several contributions: Firstly, it reveals the perspectives of Chinese citizens on land use following four decades of swift development. Secondly, it constructs a multi-level conceptual framework to facilitate the empirical investigation. Thirdly, the study offers statistical insights into the varying impacts of these determinants across individual, community, and regional levels, highlighting the differences between urban and rural areas. Lastly, it provides policy recommendations to address the NIMBY challenge in China and similar contexts in other developing nations.

## II. Conceptual framework and research hypotheses

To understand the formation of NIMBY intentions, we develop a conceptual framework and propose a series of hypotheses at three levels: the individual and household level, the community level, and the regional level. The conceptual framework is shown in Figure 1. It is



**Figure 1.** Analytical framework for the determinants of NIMBY intentions. The plus sign (+) represents a positive effect on residents' NIMBY intention, while the minus sign (-) represents a negative effect. The sign (?) indicates two opposing hypotheses, and the symbol needs to be determined.

worth noting that all research hypotheses are proposed while controlling for other factors.

### **Individual/Household characteristics**

Previous surveys have revealed differences in NIMBY intentions between men and women. For example, Bord and O'Connor (1997) found that women are more concerned than men about health and environmental risks from hazardous waste plants and global warming. Vittes et al. (1993) found a lower acceptance among women (36.6%) for local facility construction compared to men (63.4%). A review conducted by Davidson and Freudenburg (1996) highlighted women's heightened concerns about technology and the environment, especially regarding facilities and technologies with contamination risks.

The driving forces behind gender differences in environmental surveys can be suggested in two aspects. First, studies show gender differences in risk perception, with women viewing environmental hazards as riskier than men (Flynn, Slovic, and Mertz 1994), and economic experiments confirming women's greater risk aversion compared to men (Croson and Gneezy 2009; Eckel and Grossman 2008). Second, women's instinctive roles as nurturers and caregivers heighten their environmental concerns. They describe their activism in communities as an extension of their familial and household responsibilities (Pardo 1990). Hence, we propose Hypothesis A1.

**Hypothesis A1:** Women have stronger NIMBY intentions than men.

Education level has also been identified as a major factor determining residents' NIMBY intentions, although there is conflicting evidence regarding the direction. On the one hand, lower education levels, linked to a lack of scientific knowledge, often lead to public opposition against science and technology, resulting in these individuals typically opposing high-tech facility construction (Durant, Evans, and Thomas 1989). Conversely, highly educated

individuals often possess extensive information and act as communication agents in campaigns (Zheng and Liu 2018), aiding in resolving collective action issues (Yang and Wu, 2009).

On the other hand, there is also strong empirical evidence indicating a positive correlation between higher education and NIMBYism (Wright 1993). More educated individuals are found to understand arguments and evidence put forward regarding the risks and toxicity of local land use better, making them more likely to consider themselves environmentalists with a high NIMBY intention (Zhong 2018). Besides, well-educated elites tend to seek out and find information that aligns with their pre-existing views, reinforcing these beliefs and thereby intensifying the NIMBY intention (Vittes, Pollock, and Lilie 1993). Therefore, we propose two competitive hypotheses, Hypothesis A2a and Hypothesis A2b.

**Hypothesis A2a:** Individuals with lower levels of education have stronger NIMBY intentions.

**Hypothesis A2b:** Individuals with higher levels of education have stronger NIMBY intentions.

Environmental quality, viewed as a normal good, is valued higher and invested in when residents' incomes rise. Low-income groups often focus on basic needs and may be less able to invest in environmental preservation, whereas high-income groups, with better risk perception and more resources to preserve their quality of life, tend to have stronger NIMBY intentions. It is generally true that hazardous facilities are located near low-income and ethnic minority communities (Saha and Mohai 2005). These groups lack sufficient resources to protect themselves from the threat of pollution. Besides, low-income residents cannot escape their dependence on potential job opportunities brought by NIMBY projects. That said, they would consider these projects as opportunities to increase their

incomes, even though it would potentially damage their health (Whittemore and BenDor 2019). Thus, we propose Hypothesis A3 as follows.

**Hypothesis A3:** Individuals with higher incomes have stronger NIMBY intentions.

Residents often protest the construction of facilities due to worries about falling house prices. These worries stem from the belief that some constructions like waste treatment plants, power stations, and affordable housing could negatively impact the area's desirability and attractiveness, leading to property value decline caused by potential environmental pollution, noise levels, traffic congestion, or other negative consequences (Kohlhase 1991; Wassmer and Wahid 2019). Housing is a crucial asset for most families in China, with a relatively high rate of ownership (Ren, Folmer, and Vlist 2018). For many house owners, their homes serve not only as residences but also as significant investments. Therefore, any perceived threat to property values can be a cause for concern. Hence, we propose Hypothesis A4.

**Hypothesis A4:** Houseowners have stronger NIMBY intentions than house renters.

From the perspective of political science, NIMBY conflicts are also viewed as a game between citizens and government (Chiu and Lai, 2009; O'Hare, 1977). Trust in government plays a critical role in shaping public receptivity in NIMBY-based conflict (Kraft and Clary 1991; Krannich and Albrecht 1995). High levels of government trust facilitate a more receptive attitude among residents towards NIMBY projects, as they are more likely to accept the information provided by the government regarding the necessity, potential risks, and benefits of these projects.

Conversely, a deficit in government trust can lead to scepticism and resistance. When selecting the location of large-scale projects, a commonly used decision-making model is the 'Decide-Announce-Defend (DAD)', in which the government primarily considers experts' advice to make

a *decision*, then *announces* it to the public before finally *defending* the decision (Cascetta and Pagliara 2013). DAD is often observed in China as the careers of local government officials are intricately linked to local economic development (Gu 2016). This kind of 'top-down' decision approach, while efficient in expediting new projects, often lacks openness and transparency, which can be a concern for public engagement and accountability (Liu et al. 2019). In this context, residents' distrust of the government could further enhance their anxiety and perceptions of risk, thus aggravating the opposition. Therefore, we propose Hypothesis A5.

**Hypothesis A5:** Individuals with lower trust in the government have stronger NIMBY intentions.

Opportunities for public participation provide civil engagement, which forms effective cooperation and even a delegated relationship between individuals and governments (Arnstein 1969). Public participation is widely regarded as an effective solution to NIMBY conflicts (Sun et al. 2016; Zheng and Liu 2018). Residents are also more likely to consider the broader social benefits of facilities rather than just their self-interest in public participation, thus weakening their NIMBY intentions. Conversely, people unwilling or unable to participate in public decision-making generally rely on informal networks as primary information sources. These individuals are more likely to be affected by rumours, which often amplify concerns about facilities to be built near their residences. Therefore, we propose Hypothesis A6.

**Hypothesis A6:** Individuals with more willingness to participate in public affairs have weaker NIMBY intentions.

### **Community characteristics**

As NIMBY campaigns are formed by the collective action of people living near planned projects, the characteristics of the community should also be expected to explain residents' NIMBY intentions

partly. We investigate two factors at the community level: the proportion of migrants and the closeness of the community's social networks.

For decades, millions of people from rural areas and small towns in China have moved to cities, searching for better opportunities. In communities with a significant influx of migrants, the tendency towards a weak NIMBY reaction can be attributed to several socio-cultural and economic factors. Lack of cultural and social integration puts migrants on the periphery of community engagement, making them insensitive (and even utterly ignorant to) to local issues such as environmental degradation (Zhang et al. 2023). Additionally, the transient nature of many migrants' urban residence, primarily for employment opportunities, fosters a temporary mindset, reducing their concern for long-term environmental quality in the community. For example, the NIMBY movement against the Panyu waste incineration plant in Guangzhou suggested that protests organized by migrants are smaller in scale than those of the residents, and migrants are more likely to act as bystanders (Gao et al. 2016). Therefore, we propose Hypothesis B1.

**Hypothesis B1:** Individuals living in communities with a higher proportion of migrants have weaker NIMBY intentions.

Collective action theory states that when people have relatively strong social ties and relationships in their community or groups, they are more willing to join an organization and cooperate to solve common problems (Ostrom 1990). Social capital theory suggests that communities based on acquaintance networks and composed of residents with common economic or demographic traits may form a common social norm and values (Putnam 2000). If the majority of the community agrees that a certain facility is undesirable or even perceived as an external threat, local residents with integrated networks tend to strengthen the capacities of local groups and develop a strong opposition to the construction of the facilities. Thus, we establish Hypothesis B2.

**Hypothesis B2:** Individuals living in communities with closer social networks have stronger NIMBY intentions.

### *Regional characteristics*

Regional development levels are closely related to individuals' NIMBY attitudes. It's observed that many projects with negative external impacts are indeed often located in suburban or rural areas, which could be attributed to the market dynamics (Bullard 2019). Specifically, the population living in economically backward areas tends to have a lower awareness of environmental concerns and a reduced capacity to oppose NIMBY facilities, often accompanied by lower compensation expectations. If market mechanisms work, areas designated for such projects may become concentrated with more economically disadvantaged groups as a result of reducing transaction or negotiation costs.

Moreover, public infrastructure, services and job opportunities are positively correlated with economic development. Regions with lower economic development may rely more on income generated by NIMBY facilities for further economic growth compared to regions with higher economic development (Bond 1999). Finally, residents living in more developed regions can obtain information regarding the projects in advance or during their development through diversified channels, including government media and emerging social media. Thus, by accessing information about the project and its possible threats to human health and the environment, they are more likely to oppose the construction of facilities (Li 2015). Hence, we propose Hypothesis C1.

**Hypothesis C1:** Individuals living in more economically developed regions have stronger NIMBY intentions.

Based on similar reasoning as mentioned in Hypothesis C1, we can also hypothesize that residents in urban regions tend to have stronger NIMBY intentions than those in rural regions, as

urban areas are generally more developed than rural areas. This deduction could be further strengthened considering the disparities between urban and rural land systems in the context of China. More specifically, in China, land in urban areas is state-owned, and the household assets of urban residents are directly tied to house prices (Gyourko et al. 2022). As a result, urban residents may oppose the establishment of facilities with negative externalities in neighbouring communities due to concerns about falling housing prices as we discussed in Hypothesis A4. On the contrary, a rural homestead in China, however, does not have access to the process of market circulation as land is collectively owned (Zhou, Li, and Liu 2020). Consequently, we can infer that urban residents are more inclined to avoid projects with negative impacts constructed around neighbourhoods compared to their rural counterparts.

**Hypothesis C2:** Individuals living in urban areas have stronger NIMBY intentions.

Another critical factor rarely examined by previous studies is population density. Densely populated areas are generally associated with high levels of economic development, which may exacerbate residents' NIMBY intentions, as proposed by Hypothesis C1. Furthermore, high-density populations amplify the proposed facilities' possible health and environmental risks by the simple factor that more people could be affected. Thus, residents of regions with higher population densities are theorized to exhibit stronger NIMBY intentions due to concerns over the harm caused by facilities to both themselves and their neighbours. Hence, Hypothesis C3 is proposed.

**Hypothesis C3:** Individuals living in regions with higher population densities have stronger NIMBY intentions.

The current level of pollution in an area may have bidirectional effects on the NIMBY attitude of its residents. On the one hand, individuals residing in heavily polluted areas often face environmental challenges, making them more attuned to pollution

information and more inclined to oppose facilities that could exacerbate harm. That said, the prior use of chosen sites influences public reaction. For instance, protests against wind farms primarily stem from concerns over noise pollution generated, as noted by Price et al. (1996). On the other hand, residents living in an already high-pollution area might exhibit greater tolerance towards the establishment of another toxic producer (Bullard 2019), and residents living in an area with minimal pollution might strongly oppose NIMBY facilities to guard their current good environment (Xu and Lin 2020). Therefore, we put forth two competing hypotheses, Hypothesis C4a and Hypothesis C4b.

**Hypothesis C4a:** Individuals living in areas experiencing more severe pollution have stronger NIMBY intentions.

**Hypothesis C4b:** Individuals living in areas experiencing less severe pollution have stronger NIMBY intentions.

### III. Data and methodology

#### Data

The primary data set used in this study is from the 2017 wave of the *China Genuine Progress Indicator Survey* (CGPIS) and the *China Household Finance Survey* (CHFS), jointly carried out by Beijing Normal University and the Southwestern University of Finance and Economics. The survey-based data was collected through questionnaires via the Computer Assisted Personal Interviewing (CAPI) system covering individuals, families, and communities. The surveys used a stratified sampling approach and a three-phase probability-proportional-to-size sampling approach to randomly draw a sample of 40,011 households in 29 provinces, 363 districts or counties, and 1,417 communities. It provides a nationally representative sample of China. A systematic training programme was undertaken by the researcher before conducting the survey. During the survey, the enumerators emphasized the anonymity of the research to the respondents and assured them that the data would

only be used for academic purposes and would not be linked to their personal identities. Survey data is typically stored and transmitted using secure methods to protect against unauthorized access or breaches.

We obtain most variables of regional characteristics from other sources. Per capita GDP and population density in 2016 are derived from the National Bureau of Statistics of China. Housing price is collected from the website of *Anjuke*, a leading real estate broker in China. The number of high-pollution days, i.e. the number of days when the air quality index (AQI) of the city is above 200, and hazardous waste treatment plants in 2016, are collected from two public online platforms. The detailed data sources are listed in Appendix A.

### Variables and descriptive statistics

As the key dependent variable, individuals' NIMBY intention is measured by the question, 'What do you think of building a large-scale chemical plant with low pollution in your city?'<sup>1</sup> The respondents must select one of the following three options: '1 = allow building it near my residence', '2 = allow building it, but not near my residence', and '3 = oppose building it in this city'. To ensure the credibility of answers, we focus on respondents with age groups of 16–80, obtaining a sample of 38,775 households. Only 15.09% of the respondents reported that they would allow the facility to be built near their residence, 30.16% would allow it to be set up away from their home, and 54.76% opposed its construction in their city (Table 1). The results indicate considerable resistance to the construction of such facilities in China.

**Table 1.** Descriptive statistics.

Variable	Definition	Mean	S.D.	Min	Max
<b>Explained variables</b>					
<i>NIMBY</i>	1 = Allow building it near my residence; 2 = Allow building it not near my residence; 3 = Oppose building it in this city	2.40	0.74	1	3
<i>NIMBY_bi</i>	0 = Allow building it near my residence; 1 = Oppose building it near my residence	0.85	0.36	0	1
<b>Individual and family characteristics</b>					
<i>Female</i>	1 = female, 0 = male	0.50	0.50	0	1
<i>Schooling</i>	Years of education	9.18	4.33	0	22
<i>Ownership</i>	1 = houseowner, 0 = renter or other	0.85	0.36	0	1
<i>Trust in government</i>	Trust in local government (1 = lack of trust; 5 = full of trust)	3.70	1.10	1	5
<i>Hearing participation</i>	Willingness to attend hearing (1 = no; 5 = yes)	3.34	1.25	1	5
<i>Household income</i>	Annual household income (CNY)	90,675	193,720	0	5,000,000
<b>Community characteristics</b>					
<i>Share of floating population</i>	Floating population/permanent population	0.18	0.26	0	1
<i>Number of social organizations</i>	Number of voluntarily established social organizations	1.59	3.90	0	52
<b>Regional characteristics</b>					
<i>Urban</i>	0 = rural areas, 1 = urban areas	0.68	0.47	0	1
<i>Population density</i>	Population density in the area (1000 people/square kilometre)	3.5	7.2	0	45
<i>Per capita GDP</i>	Regional per capita GDP (CNY)	70,524	37,564	11,395	167,411
<i>High-pollution days</i>	Days of heavy pollution in a year	11.58	17.85	0	83
<i>Number of HWT plants</i>	Number of hazardous waste treatment plants	0.78	1.87	0	15
<b>Control variables</b>					
<i>Age</i>	Years old	52.91	14.48	16	80
<i>Married</i>	1 = married, 0 = unmarried	0.94	0.24	0	1
<i>CPC</i>	1 = member of CPC, 0 = others	0.10	0.31	0	1
<i>Household Size</i>	Number of family members	3.21	1.55	1	5
<i>Young15</i>	Number of family members under 15 years old	0.48	0.76	0	7
<i>Old70</i>	Number of family members above 70 years old	0.50	0.31	0	4
<i>Heavy-polluting enterprises</i>	Heavy-polluting enterprises in the community (1 = yes, 0 = no)	0.05	0.21	0	1
<i>Protest</i>	Precedents to protest and alleviate pollution (1 = yes, 0 = no)	0.14	0.35	0	1
<i>Funds</i>	Special funds for environmental protection in the community (1 = yes, 0 = no)	0.26	0.44	0	1
<i>Housing price</i>	Average housing price in the area (CNY/square metre)	14,895	18,890	1,975	158,896

(1) The total number of observations is 38,775, but some variables are missing data points. (2) CPC is the Communist Party of China.

<sup>1</sup>In this study, 'city' refers to the municipal-level city where residents live, including rural areas and urban areas.



Regarding individual characteristics, 50.3% are male, and the average education is 9.18 years. The average age of respondents is 52.91 years, and 93.9% of respondents are married. Residents' trust in the local government is measured by personal evaluation on a scale of 1–5 (where 1 = lack of trust and 5 = complete trust), with an average score of 3.70. Individuals' willingness to participate in public affairs is measured by whether they would be willing to attend a project hearing, one of the most popular ways of public participation in decisions,<sup>2</sup> with an average score of 3.34.

Regarding household-level characteristics, the average number of family members is 3.21, with an average of 0.48 members aged below 15 years and 0.5 members aged 70 and above. The average annual household income is 90,675 CNY, with a standard deviation of 193,720, which is then transformed into a logarithmic form for our analysis.

The two main community-level characteristics are the proportion of floating populations and the number of voluntarily established social organizations, such as environmental volunteer associations, mutual aid groups for the care of the disabled/elderly, and agricultural cooperatives. The proportion of floating populations represents the social cohesion of the community, and the number of social organizations acts as an indicator

of the closeness of a community's social networks. The average values for these two variables are 0.18 and 1.59, respectively. The other three community environment variables included as control variables are high-polluting enterprises, any protest against pollution, and any specific fund for environmental protection in the community.

The regional characteristics include urban areas, population density per capita GDP, high-pollution days, the number of hazardous waste treatment plants and housing prices. Urban residents account for 67.92% of the sampled households. The surveyed regions' population density averages 3,500 people/km<sup>2</sup>, and the housing price is 14,895 CNY/m<sup>2</sup>. Per capita GDP, used as a proxy for regional economic development, averages 70,524 CNY. The averages of the high-pollution days and the number of hazardous waste treatment plants are 75.62 and 0.78, respectively.

Table 2 shows the NIMBY intention distribution in different education levels, genders, residential areas, and family income levels. First, education level is positively related to opposition to facilities. A total of 24.50% of the population with a primary school education or below would agree to build the facilities near their residence, which is much higher than 8.90% of the respondents with a bachelor's degree or above with a similar view. Second, women

**Table 2.** NIMBY intention proportions by different groupings (% ,  $N = 37,625$ ).

Variables	Categories	Proportion	NIMBY intention		
			1	2	3
Education level	Primary school or below	32.03	24.50	30.54	44.96
	Junior middle school	31.36	14.49	32.65	52.86
	Senior middle school	14.36	10.02	29.44	60.54
	Polytechnic school	5.40	7.92	30.25	61.83
	Junior college	7.95	5.52	26.25	68.23
	Bachelor or above	8.90	4.39	24.54	71.07
Gender	Female	49.68	12.99	30.71	56.29
	Male	50.32	17.15	29.61	53.24
Living area	Urban	68.34	10.35	29.45	60.20
	Rural	31.66	25.30	31.69	43.01
Annual household income (thousand CNY)	below 20	24.90	24.62	30.87	44.52
	20–50	22.74	16.82	31.15	52.04
	50–100	27.14	11.71	31.00	57.30
	100–200	17.36	9.08	28.63	62.29
	200–300	4.32	7.43	26.27	66.30
	above 300	4.05	6.77	25.77	67.46

<sup>2</sup>During a hearing, the government presents information regarding the project's costs, revenues, financing and operational methods, among others. Subsequently, delegates have the opportunity to raise questions, make statements or deliver speeches about the projects. The willingness of individuals to participate in the hearing represents their level of interest in the project information, their perception of having a responsible role, and their belief that their presence can make a difference.

show greater NIMBY intentions than men, as only 12.99% of women choose ‘allow building near my residence’, while 17.15% of men choose this option. Third, the proportion of rural residents that lacked NIMBY intentions is 25.30%, which is substantially higher than that of urban residents (10.35%). Last, NIMBY intentions exhibit an apparent upward trend with increasing family income. Among individuals with a 20,000 CNY per year or lower family income, 24.62% did not express a NIMBY intention, while this proportion is only 6.77% for residents with a family income of over 300,000 CNY per year.

### Econometric specification

Respondents’ answers about their NIMBY intentions contain three options, where the larger value represents stronger opposition to facilities. We, therefore, employ an ordered logit regression to study the driving factors of NIMBY intention. The regression equation is specified as follows:

$$NIMBY_i = \alpha + X_i'\beta + Z_i'\gamma + \sum_p \delta_p + \varepsilon_i, \quad (1)$$

where  $NIMBY_i$  represents the NIMBY intention of individual  $i$ .  $X_i$  is the vector of major driving factors, including individual and family characteristics, community characteristics, and regional characteristics, as summarized in Table 1.  $Z_i$  is the vector of control variables. Considering the spatial differences in economic development and cultures, we further control provincial fixed effects  $\delta_p$  in some regressions.  $\varepsilon_i$  is the disturbance term.

To check the robustness of the baseline model, we also estimate Multi-Nominal Logit model and Logit model since NIMBY intention is a discrete variable. Furthermore, we use alternative measurements for several key independent variables. Following the base models and robustness tests, we further explore the relative importance of each variable in explaining residents’ NIMBY intentions through standardized regressions. Moreover, the formation of NIMBY intentions for rural and urban residents may be

quite different. Therefore, we estimate Equation (1) using separate rural and urban samples to detect possible heterogeneity in the determinants of NIMBY intentions.

## IV. Results

### Individual and family characteristics

The baseline results of the ordered logit regression in Column (1) of Table 3 show that all individual characteristics significantly affect residents’ NIMBY intentions at the 1% level. The odds ratio of *Female* above one suggests that women have stronger NIMBY intentions than men. Specifically, holding other variables constant, females are 24% more likely than males to reject the construction of NIMBY facilities in cities. Hence, the result supports Hypothesis A1.

The odds ratios for education level and annual household income above one indicate that these variables are positively related to NIMBY intention. Specifically, for each additional year of education, the odds of residents refusing the construction of NIMBY facilities in the city increases by 8.8%, and a 1% increment in household income increases the odds of residents refusing the construction of NIMBY facilities in the city increases by 5.9%. These results, therefore, support Hypotheses A2b and A3.

Additionally, ownership also shows a positive relationship with residents’ NIMBY intention. The odds ratio indicates that homeowners are 9.9% more likely to refuse the construction of NIMBY facilities in the city compared to renters, which supports Hypothesis A4.

For individual political factors, the odds ratio of trust in government is lower than one, demonstrating that trust in the local government is negatively related to NIMBY intention. Therefore, residents with more confidence in the local government are less likely to engage in NIMBY protests. These results, therefore, provide support for Hypothesis A5. As residents’ willingness to attend public hearings (hearing participation) has an odds ratio below one, public participation is shown to be negatively associated with NIMBY intention. Thus, the more active an individual’s involvement in public affairs and the better their access to information, the less likely they are to engage in NIMBY protests. Hence, evidence is provided to support Hypothesis A6.

Column (3) shows that when all variables are included for communities and regions in the regressions, the signs and significance levels of individual and family characteristics are almost unchanged, while the absolute values of odds ratios fall slightly.

### Community characteristics

Columns (2) of Table 3 provide the results of models that investigate the influence of community characteristics on residents' NIMBY intentions while considering individual- and family-level factors. It is observed that the proportion of the floating population in a community has a significant and positive influence on residents' NIMBY intentions based on the odds ratio above one, which provides evidence

to reject Hypothesis B1. The number of volunteer-established social organizations (number of social organizations) has an odds ratio above one, which suggests that denser social networks within a community produce stronger NIMBY intentions. These results also remain significant when regional characteristics are controlled. Therefore, we find evidence to support Hypothesis B2.

### Regional characteristics

In terms of regional characteristics, we observe that three economic characteristics significantly affect residents' NIMBY intentions. First, a significant odds ratio above one in Column (3) for Log per capita GDP indicates a positive association with NIMBY intentions. Besides, a significant odds

**Table 3.** Determinants of residents' NIMBY intentions.

Variables	Ordered logit regression		
	(1)	(2)	(3)
<b>Individual/family characteristics</b>			
<i>Female</i>	1.239*** (0.026)	1.205*** (0.026)	1.091*** (0.025)
<i>Years of schooling</i>	1.088*** (0.003)	1.080*** (0.003)	1.053*** (0.004)
<i>Log household income</i>	1.059*** (0.005)	1.046*** (0.005)	1.018*** (0.006)
<i>Trust in government</i>	0.966*** (0.009)	0.962*** (0.009)	0.959*** (0.010)
<i>Hearing participation</i>	0.932*** (0.008)	0.936*** (0.008)	0.960*** (0.008)
<i>Ownership</i>	1.099*** (0.032)	1.193*** (0.036)	1.273*** (0.041)
<b>Community characteristics</b>			
<i>Share of floating population</i>		1.845*** (0.083)	1.113** (0.059)
<i>Number of social organizations</i>		1.030*** (0.003)	1.010*** (0.003)
<b>Regional characteristics</b>			
<i>Urban</i>			1.420*** (0.040)
<i>Log per capita GDP</i>			1.242*** (0.041)
<i>Log population density</i>			1.087*** (0.012)
<i>High-pollution days</i>			1.004*** (0.001)
<i>Number of HWT plants</i>			1.037*** (0.007)
Controls	YES	YES	YES
Provincial fixed effect	NO	NO	YES
Observations	36,765	35,072	34,077
Pseudo R <sup>2</sup>	0.028	0.033	0.054

(1) Standard errors are reported in parentheses. \*\*\*, \*\*, and \* represent statistical significance at 1%, 5%, and 10% levels, respectively. (2) The results reported in Columns (1)–(3) are odds ratios. (3) Pseudo R-squared are reported in Columns (1)–(3). (4) Control variables in Column (1) include age, the square of age, CPC membership, marriage status, the number of family members, and the number of family members under the age of 15 and over the age of 70. Column (2) additionally controls whether the community has high-polluting enterprises, NIMBY precedent and a special fund for environmental protection are extra controls based on Column (1). Column (3) additionally controls log of the regional housing price based on Column (2).

ratio above one for Urban indicates that residents of urban areas have stronger NIMBY intentions than people living in rural areas. These results support O'Hare. Also, the odds ratio above one for Log population density verifies Hypothesis C3.

Regarding regions' environmental indicators, the odds ratios for High-pollution days and the Number of HWT plants in Column (3) are above one and significant. This result suggests that severe local pollution leads residents to develop strong NIMBY intentions. Thus, these results support Hypothesis C4a.

### Robustness tests

A potential concern with our basic results is the non-ordinal nature of the three *NIMBY* response

options in the CGPiS survey, potentially rendering the ordered logit and linear models unsuitable. To address this concern, we first employed the Multi-Nominal Logit (MNL) regression, treating the three options as mutually independent. We then introduced a dummy variable *NIMBY<sub>bi</sub>*<sup>3</sup> to differentiate between the opposition and support for NIMBY.

Columns (1) and (2) of Table 4 report the results of the MNL model. Respondents who opted 'allow building it near my residence' (*NIMBY* = 1) are taken as the base group. Column (1) indicates the determinants of a shift in the NIMBY intention from the base group to 'allow building it, but not near my residence'. Notably, several factors significant in basic results, like government trust, migrant

**Table 4.** Robustness tests for determinants of residents' NIMBY intentions.

	(1)	(2)	(3)	(4)	(5)
Variables	MNL <i>NIMBY</i> = 2	MNL <i>NIMBY</i> = 3	Logit <i>NIMBY<sub>bi</sub></i>	Ologit Urban	Ologit Rural
Individual/family characteristics					
<i>Female</i>	1.303*** (0.049)	1.266*** (0.045)	1.282*** (0.044)	1.093*** (0.030)	1.034 (0.041)
<i>Years of schooling</i>	1.051*** (0.006)	1.083*** (0.006)	1.070*** (0.005)	1.068*** (0.004)	1.022*** (0.006)
<i>Log household income</i>	1.022** (0.009)	1.030*** (0.009)	1.027*** (0.008)	1.027*** (0.007)	1.002 (0.009)
<i>Ownership</i>	1.222*** (0.065)	1.467*** (0.074)	1.367*** (0.066)	1.303*** (0.047)	1.116 (0.087)
<i>Trust in government</i>	0.984 (0.016)	0.949*** (0.015)	0.963*** (0.014)	0.950*** (0.012)	0.974 (0.016)
<i>Hearing participation</i>	0.903*** (0.013)	0.915*** (0.013)	0.910*** (0.012)	0.969*** (0.011)	0.948*** (0.014)
Community characteristics					
<i>Share of floating population</i>	1.027 (0.099)	1.131 (0.103)	1.096 (0.097)	1.155** (0.068)	0.896 (0.131)
<i>Number of social organizations</i>	1.025*** (0.008)	1.029*** (0.007)	1.029*** (0.007)	1.009** (0.004)	1.043** (0.020)
Regional characteristics					
<i>Urban</i>	1.502*** (0.067)	1.708*** (0.072)	1.619*** (0.064)		
<i>Log per capita GDP</i>	1.235*** (0.064)	1.378*** (0.069)	1.303*** (0.061)	1.248*** (0.055)	1.298*** (0.069)
<i>Log population density</i>	1.063*** (0.020)	1.129*** (0.021)	1.103*** (0.020)	1.087*** (0.014)	1.087*** (0.029)
<i>High-pollution days</i>	1.001 (0.002)	1.003* (0.002)	1.002 (0.002)	1.005*** (0.002)	1.001 (0.002)
<i>Number of HWT plants</i>	1.009 (0.013)	1.044*** (0.012)	1.031*** (0.012)	1.032*** (0.009)	1.030** (0.014)
Controls	YES	YES	YES	YES	YES
Provincial Fixed Effect	YES	YES	YES	YES	YES
Observations	34,077	34,077	34,077	22,994	11,083
Pseudo R-squared	0.067	0.067	0.114	0.037	0.044

(1) Standard errors are reported in parentheses; \*\*\*, \*\*, and \* represent statistical significance at the 1%, 5%, and 10% levels, respectively.

(2) The results reported are odds ratios. (3) Control variables are the same as Column (2) in Table 3.

<sup>3</sup>It assigns a value of 1 to the respondents who chose 'allow building it near my residence' and 0 to the respondents who chose 'allow building it, but not near my residence' or 'oppose building it in this city'.

community share, and local pollution levels, became insignificant. Column (2) shows the determinants of a shift from the base group to ‘oppose building it in this city’, with the most significant factors from basic results still holding significance. Column (3) in Table 4 reports the logit regression results using the binary variable *NIMBY\_bi* as the dependent variable. These results largely align with the ordered logit regressions in Column (3), Table 3, in terms of odds ratios’ signs and significances, affirming consistency across different econometric approaches.

In addition, we assessed several important characteristics, including education, trust in the local government, social network, housing price, regional economic development, and local pollution level, with alternative measurements to verify robustness (Appendix B). These additional analyses reinforce that the findings from the basic model in Table 3 remain valid.

## V. Discussion

### *Relative importance of the determinants: standardized regressions*

This subsection intends to answer another question: among those determinants in discussion,

which one is more important or salient in explaining residents’ NIMBY attitude? To answer this question, we explore the relative importance of each variable in explaining residents’ NIMBY intentions through standardized regressions. In doing so, the standardized coefficients of each factor are comparable.

The results of standardized regressions are illustrated in Figure 2. Among all the characteristics, *years of schooling* have the most significant influence on residents’ NIMBY intentions, with an increase of one standard deviation (SD) in years of education associated with a rise in residents’ NIMBY intentions by 0.108 SDs. The dummy variable *Urban* has the second-largest impact on residents’ NIMBY intentions (0.09 SDs). Furthermore, if per capita GDP increases by one SD, residents’ NIMBY intention rises by 0.073 SDs. Lastly, population density, ownership, high-pollution days, and the number of hazardous waste treatment plants also significantly affect residents’ NIMBY intentions. Indeed, increasing these factors by one SD will increase NIMBY intention by at least 0.03 SDs.

On the contrary, community characteristics, such as the share of the floating population and the number of social organizations, are less influential on NIMBY intentions. Political factors also have a sizable impact on residents’ opposition to the construction of the facility. For each SD

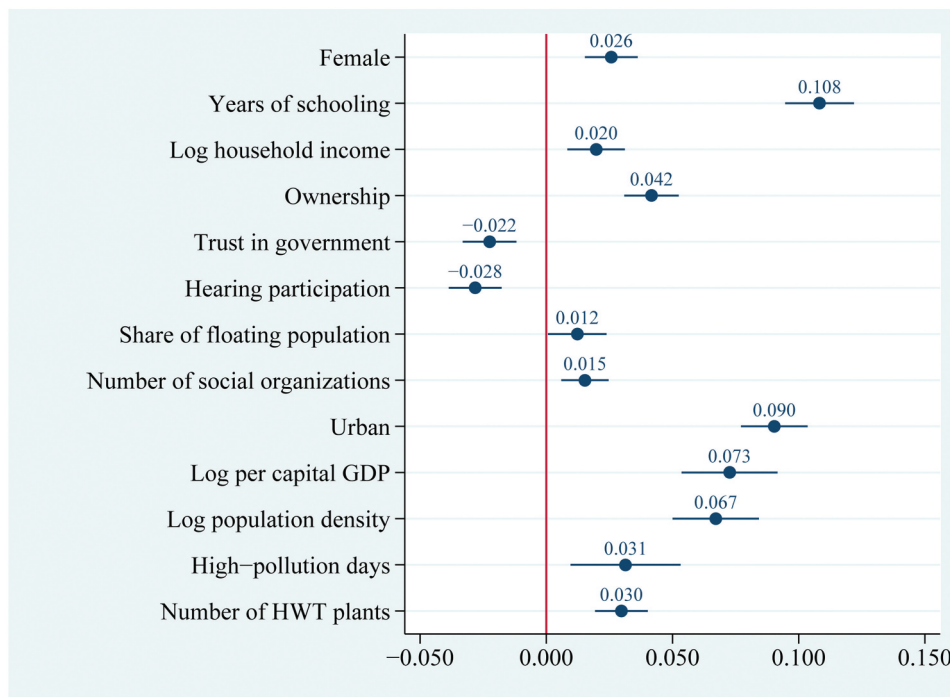


Figure 2. Standardized coefficients of determinants of residents’ NIMBY intentions.

increase in the desire to participate in public affairs and trust in the local government, the NIMBY intention falls by 0.028 and 0.022 SDs, respectively.

### **Relations to the literature and further explanations**

In this paper, we re-establish an analytical framework on the determinants of residents' NIMBY attitudes at multiple levels.

In terms of individual and family level, we provided evidence that women residents exhibit higher NIMBY intentions than men, as many scholars have suggested (Bord and O'Connor 1997; Davidson and Freudenburg 1996; Vittes, Pollock, and Lilie 1993). By valuing women's opinions and involvement in the NIMBY movement, a potential solution to the NIMBY problem may be found. Additionally, increased schooling years and income were found to intensify residents' concerns about NIMBY facilities. This finding echoes previous studies showing that better-educated or wealthier individuals, with their wider knowledge and greater information access, are more aware of the environmental and health risks linked to NIMBY facilities (Vittes, Pollock, and Lilie 1993; Wright 1993; Zhong 2018). This finding further backs up NIMBY movement practices, where educated and affluent residents effectively legitimize and mobilize public support for their concerns (Li, Liu, and Li 2012). Our findings reveal that homeowners exhibit greater concern over NIMBY facilities, which remains consistent after accounting for regional housing prices. This apprehension likely arises from fears of asset depreciation and reduced housing quality (Fischel 2002). This result is supported by literature suggesting that middle-class, property-owning individuals are the primary drivers of NIMBY movements (Cai 2005). Given the growing trend of property ownership in China, resistance against NIMBY facility construction is expected to intensify. Consistent with prior research (Hsu 2006; Zheng and Liu 2018), we

also found that higher government trust and civic engagement can mitigate NIMBY intentions. Globally, Chinese citizens show a high level of trust in their government.<sup>4</sup> Our survey data reflects varied levels of trust in local government,<sup>5</sup> suggesting respondents provided candid responses, likely due to the anonymity guaranteed in academic surveys.

Regarding the community level, social capital has been found to encourage NIMBY intentions among residents. This finding aligns with both the collective action theory and the social capital theory (Ostrom 1990; Putnam 2000). Communities rich in social capital are often characterized by strong cohesive bonds, fostering a heightened vigilance against external changes perceived as threats to the community environment. However, we find it concerning that Hypothesis B1, which claims individuals living in communities with a higher proportion of migrants have weaker NIMBY intentions, is rejected (Column 2, Table 3). We attribute this to the fact that the share of the floating population may represent not only socio-economic diversity at the community level but also economic development at the regional level. Areas with more migrants are typically urban, with higher GDP per capita and population density.<sup>6</sup> Consequently, when regional variables are controlled, the effect of the share of the floating population diminishes, resulting in a decrease in magnitude (Column 3, Table 3) or significance (Table 4) of the odds ratio.

Finally, at the regional level, we found that residents living in economically developed or urban areas possess stronger NIMBY intentions than those in less developed or rural areas. This finding empirically supports the notion of market-driven environmental injustice, suggesting that residents in low-income and ethnic minority areas often disproportionately bear the costs of NIMBY facilities (Albrecht 1995; Čapek 1993; Cutter 1995). We also found that regional environmental pollution, as indicated by the number of hazardous waste

<sup>4</sup>For example, the 2022 Edelman Trust Barometer, released by Edelman, the world's largest public relations consulting firm, reveals that the Chinese public exhibits a remarkable level of trust in all four categories of organizations: government (scoring 89 out of 100), business (84), media (79), and non-governmental organizations (78). Meanwhile, the overall trust level remains at 83, which is the highest among all surveyed countries worldwide.

<sup>5</sup>In our survey, 5.2%, 8.02%, 24.68%, 35.32%, and 26.77% of respondents reported 'very low', 'low', 'average', 'high', and 'very high' trust, respectively.

<sup>6</sup>We also conduct a simple correlation analysis to confirm the positive correlation between share of floating population at the community level and a range of variables at the regional level.

treatment plants, significantly increases residents' NIMBY intentions. This suggests that in areas with higher levels of environmental pollution, residents are more likely to perceive inadequacies in current pollution management and strongly oppose new NIMBY facilities. This observation is consistent with historical cases like Love Canal in New York, where the community's strong resistance to any further industrial or waste-related developments stemmed from the health issues linked to mismanaged toxic waste (Paigen 1982).

### **Rural-urban heterogeneity: the rural-urban division of land system in China**

The formation of NIMBY intentions varies between rural and urban residents. As shown in Table 4, Columns (4)-(5), factors like gender, education, income, home ownership, and trust in government notably influence NIMBY intentions of urban residents, whereas public participation willingness more significantly impacts rural residents. Community characteristics, such as the floating population's share, positively affect NIMBY intentions in urban areas, suggesting different underlying mechanisms in urban contexts.

The observed disparities in NIMBY determinants between urban and rural residents may be rooted in the constitutional distinction that rural land is collectively owned, whereas urban land is state-owned in China (Liu 2018). This dualistic system restricts collective land from direct market participation, unlike state land which gains value through industrial and real estate development. Rural collectively owned land can only enter the market after it has been expropriated by the government and transformed into state-owned land. Thus, local governments often employed a model of expropriation-compensation to accelerate urbanization and industrialization. Farmers often relinquish their land for compensation under the prospect of economic development and the opportunity for non-agricultural employment. That said, projects like chemical plants, offering local job opportunities and presenting minor initial externalities, initially encounter lesser resistance. Typically, a resistance movement in rural areas can only be launched when pollution becomes apparent,

reflecting farmers' tendency to perceive hazards only after they manifest (Li 2015).

Urban residents' opposition to NIMBY facilities, primarily driven by concerns over property value depreciation, differs markedly from rural residents' motivations and is closely linked to China's market-oriented reforms. After the founding of the People's Republic of China, urban housing was mainly allocated by the *danwei* system under the planned economy (Wu 1996). After the reform and opening-up, China's transition to a market economy altered urban land use, making the rights to use state-owned land transferable and enabling market-based home ownership. This change tied urban residents' asset appreciation directly to personal interests. Consequently, with urbanization inflating property values, urban residents increasingly resist NIMBY facilities to avoid their poverty values being depreciated.

However, rural residents are also showing similar results to their urban counterparts when it comes to certain key determinants. This trend can be largely attributed to the dynamics of migration, influenced significantly by the ongoing processes of urbanization and industrialization. With the improving educational levels in rural areas and the abundance of job opportunities in urban areas, more and more rural residents are migrating to urban areas in search of employment. The migration of rural migrants to urban areas, despite the existing barriers imposed by household registration, may lead to a gradual convergence of lifestyles and values, such as environmental conservation and rights advocacy.

## **VI. Conclusion**

Based on nationally representative data from CGPiS and CHFS 2017, this study presents the overall NIMBY intention of Chinese residents and its determinants at three levels (individual, community, and regional). We find that 85% of respondents report that they would oppose the building of a potentially harmful facility near their residence. Women, people with more education, high-income groups, and house owners are more likely to have strong NIMBY intentions, while residents with

a higher willingness to participate in public affairs and more trust in the local government exhibit weak intentions. Community characteristics also play a significant role as people living in communities with denser social networks are more likely to have strong NIMBY intentions, especially in rural areas. At the regional level, people living in urban areas or more developed districts, as well as regions with higher population density or higher local pollution, are found to possess stronger NIMBY intentions.

This study helps to answer whether the NIMBY dilemma is inevitable in China and other developing countries with similar conditions. On the one hand, NIMBY movements originate from the rapid economic and social development, which comes with contradictions between individual interests and social welfare. As is indicated in the empirical results, NIMBY intention is bound to increase with education, income, and urbanization. However, on the other hand, NIMBY syndrome results from the lack of communication and citizen engagement in governance. Therefore, there is a possibility of exploring policy options to solve the NIMBY dilemma. First, as public participation in local governance can alleviate NIMBY intention, governments should encourage citizens to participate in community governance by offering more flexible channels, such as mayor hotline systems in China and regular public hearings. Second, as higher trust in the local government is associated with lower NIMBY intention, local governments can rebuild people's trust by timely releasing relative information to residents and avoiding blocking messages on social media, moving beyond the traditional decision-making model of DAD. Third, as poor local environmental conditions aggravate NIMBY intentions, effective environmental protection can play a crucial role in solving the NIMBY dilemma.

Acknowledging the exploratory scope of this study, it suggests a need for future research to expand on three principal aspects. First, despite the survey we draw on being nationally representative, the measurement of NIMBY intention in the CGPiS questionnaire is not detailed enough. Future studies can examine residents' NIMBY intentions for various types of unwanted facilities more comprehensively. Secondly, as this study provides a broad

overview of factors affecting NIMBY intention, the estimation results do not allow for a strict causal interpretation. Therefore, future research can aim to unravel the causal links between particular variables and NIMBY intentions. Finally, the current data limits an in-depth analysis of the psychological mechanisms behind NIMBY intention, which remains a goal for future investigations.

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