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Citizen Participation and Climate Change within an Urban Community Context: Insights for Policy Development for Bottom-Up Climate Action Engagement

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Abstract: Citizen-led mitigation and adaptation are key to climate policy advancement and acceleration, particularly within an urban development context. The top-down approach requires the development of clear action plans for the involvement and engagement of citizens to accelerate bottom-up climate mitigation and adaptation efforts within the urban context. In Malaysia, there are national policy strategies such as the 12th Malaysia Plan, the National Urban Wellbeing Blueprint, the National Climate Change Policy, and the Malaysian New Urban Agenda. However, a successful implementation of climate policies can only be achieved when citizens are adequately socialized to policy impacts. This paper explores citizen perceptions and attitudes toward participation in mitigation and adaptation efforts for climate action within an urban context. Underpinned by the Theory of Planned Behavior and the Transtheoretical Theory, this study explored the approach of citizen participation as a possible tool for assessing climate policy effectiveness for bottom-up climate mitigation and adaptation efforts within an urban context. The study was set within the Malaysian urban context, given the limited empirical evidence in the area. The findings of the study suggest that a bottom-up approach to citizen participation through education, awareness, and inclusive climate policy formulation procedures will result in positive attitudes toward citizen participation.

Keywords: citizen participation; citizen attitudes; community; climate-resilient; urban development; climate policy procedures; Malaysia

1. Introduction

Climate change is a notable deviation in established climatic conditions, to increasingly erratic or inconsistent climatic conditions [1]. Some of the indicators of climate change are shifting weather patterns, extreme weather conditions, and an increase in weather-related disasters [2]. Climate change mitigation and adaptation each manage different aspects of future climate-related risks. Mitigation focuses on how to reduce the number and levels of potential hazards caused by climate change, eliminating the biggest threats first. Adaptation focuses on the ability of citizens to cope with climate risks by reducing the consequences of the level of actual harm [3]. It must be noted here that much research has been conducted to strongly suggest the complementarity of adaptation and mitigation. The benefits of managing climate risks by the integration of adaptation and mitigation measures have become very evident in different studies, at various scales of operation [4,5]. As such, these notions of the complementarity of adaptation and mitigation of climate change influenced

the focus of our study, leading us to include both aspects. Climate change mitigation and adaptation stem from concerns over the state of the natural environment by the government, local authorities, and the public [6]. Climate change mitigation and adaptation are concerned with understanding the dynamics between the natural environment and anthropogenic activities. As such, anthropogenic activities that exacerbate inefficient energy production and consumption and waste generation need to be adjusted to ensure that the levels of carbon dioxide in the atmosphere will not continue to be a threat to the future generations [7].

In Malaysia, the effects of climate change, development planning, and the lack of good natural resource management have been reported as some of the major hindrances toward successful climate change mitigation and adaptation [8]. Common climate change indicators in Malaysia are excessive flooding, frequently in the inland, riverine areas and coastal areas [9]. Recent studies have also reported that flooding incidents in Malaysia have been on the rise, recording monumental damage to the environment and infrastructure [10,11]. This has also been confirmed by studies conducted by the National Hydraulic Research Institute of Malaysia (NAHRIM), which state that more severe flooding in inland and riverine areas can be expected as climate change persists [12]. The NAHRIM studies have also confirmed that climate change is also the major cause of droughts that emanate from a lack of natural sources of water that have been displaced by the shifting climate patterns in Malaysia [13].

There is much effort by local authorities and governmental agencies in reducing the impacts of climate change in Malaysia. For instance, large cities like Kuala Lumpur, Penang, and the Iskandar Development Region in Johor Bahru are already on their climate mitigation and adaptation initiatives, with plans to achieve smart city status [14]. These cities have also taken to using technology to advance climate mitigation and adaptation efforts [15,16]. The Johor State has a total of 2,923,898 vehicles. Based on a projected population figure of around 28.725 million, the Malaysian person per car ratio of 2.95 persons/car is thus considered to be relatively high. Since most of the vehicles use fossil fuel, this is a clear indication of high CO₂ emission from the vehicular sector, particularly from privately owned cars and motorcycles in Johor alone [17]. In Kuala Lumpur, the construction of smart tunnels that serve as both roads and channels to divert floodwaters is also one of the steps taken toward climate change adaptation. The Storm Water Management Model (SWMM) is a widely used urban stormwater model developed by the United States Environmental Protection Agency (US EPA, Washington, DC, USA). As Kuala Lumpur is mostly affected by floods, the SWMM was of use, as it has a wide range of applications, including hydrologic impact assessment, catchment discretization, runoff quantity and quality modeling for short- or long-term periods, and urban floods and drainage modeling that could be useful in flood regions. These have been a breakthrough approach to reducing flooding incidents in Malaysia as well [18].

The National Adaptation Plan (NAP) to climate change which is taking a stepwise adaptation approach in its development and implementation strategies is also a major element that is assisting in addressing climate change in Malaysia [19]. Government agencies and higher education institutions are also taking steps toward climate change via the development of long-term climate change research projects in support of the government's development and planning of climate policies [20]. In addition, the year 2020 marked the end of Vision 2020 and the Eleventh Malaysia Plan (2016–2020). Measures for mitigation the of, and adaptation to, climate change, as well as disaster risk reduction, are the main focal point of both the Eleventh and Twelfth Malaysia Plans. The fourth core initiative of the plan was to promote Sustainability and Development Resilience Through Green Growth [21].

Interestingly, feedback on the 12th Malaysia Plan launched in September 2021 suggests that there may be a potential lack of local dialogue on urban emissions and climate change mitigation, relating to the central role played by individuals and local communities in climate change mitigating efforts, and the bottom-up community engagement can lead to

sustainable urban living solutions for climate resilience and mitigation [21]. The Twelfth Malaysia Plan (12 MP) is a shared prosperity initiative focusing on three issues, namely empowering the economy and achieving a sustainable environment whilst focusing on social reengineering, which is defined as strengthening security, wellbeing, and inclusivity in the 12th Malaysia Plan [22]. The economic empowerment dimension will address new ways of achieving growth and the Industrial Revolution 4.0. The environmental sustainability dimension will cover, most importantly, the mitigation of, and adaptation to, climate change. The most critical dimension, which is strengthening security, wellbeing, and inclusivity, will focus on the enhancement of societal values and building a resilient Bumiputera community, with improved wellbeing of the people. The third social reengineering dimension is a call for more consideration and involvement of the society pointing toward more community engagement and a bottom-up approach to sustainability and climate-resilient communities through community building [23].

Despite these developments, it has been predicted that the sea levels in Malaysia are expected to rise with the cumulative sea-level rise at 0.05 m from 2015 [24]. This may result in the loss of coastal land amounting to 3700 square kilometers [25]. An estimated 1.5 million people will be directly impacted by this phenomenon, and the losses are estimated at 13,804,597.40 United States Dollars [26]. Calls for clear guidelines purposed for climate change mitigation and adaptation for the local citizens are now prevalent.

For a successful implementation of mitigation and adaptation strategies, the perception and voices of the local citizens need to be prioritized in mobilizing communities for bottom-up climate action. Perception refers to a way of thinking or understanding. As defined by Van den Ban [27], perception is the process by which an individual receives information or stimuli from our environment and transforms it into psychological awareness. Perceptions of climate change have often led to either positive or negative responses from citizens. This being the case, there are a few studies that discuss the lay citizens' attitudes as perceptions of the citizens toward actual participation in climate change mitigation and adaptation [28].

In Malaysia, there is much discussion on the role of local authorities and governmental efforts in reducing the impact of climate change. The National Climate Change Policy is a guide for the ministries and government agencies that assists in the integration of climate change for its successful implementation in local policies [20]. Principle 2 of the second strategic thrust of the policy focuses on adopting a balanced adaptation and mitigation for climate-proof development, sustainability, and strengthening environmental conservation [29]. Such policies are predicted to be more effective when policy-makers are aware of their citizens' attitudes to the subject matter [30]. For a better facilitation by the government and stakeholders in solving the disasters that emanate from climate change more holistically, more attention should thus be focused on creating positive perceptions on the part of the citizens on climate change for better mitigation and adaptation issues [31,32]. This study aims to address the knowledge gap on the lack of clear guidelines for citizen participation in projects, which different stakeholders can follow whilst mobilizing citizens in environmental projects and policy-making procedures [33]. Underpinned by the Theory of Planned Behavior and the Transtheoretical Theory, this study will explore citizen perceptions and attitudes toward citizen participation in mitigation and adaptation efforts for climate action within the Malaysian urban context, as a possible tool for assessing climate policy effectiveness for bottom-up climate mitigation and adaptation efforts within an urban context. The study was set within the Malaysian urban context, given the limited empirical evidence in the area. The rest of the paper is structured as follows: Section 2 presents the materials and methods, Section 3 presents the findings, Section 4 discusses the findings, and Section 5 concludes this study.

2. Materials and Methods

2.1. Underpinning Theory

Malaysia's National Environmental Performance Index (EPI) has not always been among the highest and is evaluated in two-year intervals, examining the country's envi-

ronmental performance concerning different indicators, such as climate change and water quality [30]. Considering that the causes of environmental degradation have mainly been attributed to anthropogenic activities, socio-psychological factors among Malaysians should be explored when qualifying the level of public environmental awareness and behavior. This study, therefore, aims to bridge this gap by employing two behavioral theories that have helped shape the narrative of this study.

Communities should actively participate in the reduction of climate risks among their members. It is not enough for communities to know about climate change to be engaged. They also need to care about it, be motivated, and be able to act on and for it. Numerous social factors come into play that can influence an individual's ability and intention to contribute to their community's wellbeing. In Malaysia, research has indicated that the Malaysian populace are passive receptors of mitigation and adaptation climate knowledge [28]. Hence, more measures ought to be put in place to cultivate positive attitudes among the local citizens for more inclusive and systemic bottom-up climate action efforts. With current measures being more focused on adaptation, the central role of individuals and local communities in climate change mitigation-related efforts is now an emerging focal point [34]. Developing sustainable solutions to climate change requires long-term changes in an individual's lifestyle and attitudes [31]. The Theory of Planned Behavior and the Transtheoretical theory is useful in deciphering these notions.

The Theory of Planned Behavior (TPB) attempts to predict and understand why a person may or may not display a certain behavior [32]. The TPB posits that a person's actual behavior can be predicted by the intention to perform that behavior. TPB can potentially help our study to understand why citizens have not been active in attending climate-related initiatives in their communities as expected. Moreover, TPB can suggest ways to improve the citizens' intention to participate, which in turn results in better policy implementation, leading to a climate-resilient populace. Furthermore, the TPB postulates that climate-related initiatives that cultivate a positive attitude in the local Malaysian populace will foster communities that intend to reduce climate risk. For these reasons, the TPB is fundamental to this study.

The TPB focuses on three major factors, which are citizen's behavior intention, subjective norms, and perceived behavioral control. Behavior intention can be understood as the degree to which a person is willing to perform a certain behavior. Behavior intention is a major factor in the creation of climate-resilient communities, as intention will translate into tangible actions, such as participation in mitigation and adaptation activities in one's community. Attitude is the degree to which one favorably or unfavorably evaluates a behavior in question [33]. Active citizen participation in local adaptation measures requires positive attitudes cultivated in the community for better results in reducing climate risk. Subjective norms refer to the extent to which one's community influences them to behave in a certain manner through social pressure. This interprets the fact that communities that perform well in adaptation and local level mitigation sustainable practices are those that have cultivated a sustainable culture in their residents. Perceived behavioral control refers to an individual's ability to control the behaviors they engage in [32]. Due to the idea of results-based initiatives, communities must know that their contribution to climate-related initiatives in their community is credited to them through an organized system of check-and-balance with frequent feedback given. This theory works well with the objective of the research study, as the study seeks to provide guidelines on how to improve citizen participation for local level climate-related mitigation and adaptation issues and also policy-making procedures within the Malaysian urban populace. Interestingly, TPB was also applied to a study conducted in Iran measuring the attitudes of high school students toward climate issues [35].

Studies suggest that a behavior change occurs in stages or steps and that the movement through these stages is not linear, but cyclical. Our second theory, The Transtheoretical Model (TT), was originally developed by Prochaska and DiClemente in 1986 [34]. They proposed that behavior change occurs in five different stages, through which people move in a cyclical or spiral pattern. It has also been shown to have relevance for understanding patterns of physical activity participation and adherence. The Transtheoretical model is highly relevant to this study, particularly in understanding the change in the behaviors of individuals in local communities in urban areas, to be more environmentally conscious. The model has also been used in other studies to understand the process through which climate change efforts by experts have encouraged mitigation actions [36,37]. For this study, the Malaysian population is divided into different groups of citizens who fall in different stages of the model. The first stage is the pre-contemplation stage, where citizens have no intent to individually change their behavior soon. The second stage is contemplation, whereby citizens are aware that climate change exists and are seriously considering taking actions to address the problem [35]; however, they do not make any commitment to act. The third is the preparation stage, where citizens show that there is an intention to change, coupled with minor changes in behavior, but with limited success. This could be attributed to poorly drafted plans or a lack of skill training programs available at the community level. The action stage is where citizens alter their behavior, experiences, or environment to overcome their problems or to meet their goals by actively participating in locally organized programs. The final stage is maintenance, where people work to prevent a relapse of climate-related disasters and consolidate the gains attained in the action stage. All these stages are crucial in the creation of climate-resilient communities [34].

Equally crucial to this study is Arnstein's theory of citizen participation [36]. The theory of citizen participation highlights the different stages that are fundamental to a community's participatory behavior, by focusing on an eight-step ladder on participation. The data collected for our study indicate how urban Malaysian attitudes toward citizen participation can be placed within the ladder of citizen participation. For communities to be successful in building climate resilience, there is a need to shift from the normal passive participatory behavior to more active hands-on practices that promote bottom-up approaches to handle climate issues.

Figure 1, below, illustrates the theoretical framework of our study, which assesses citizen participation influence by planned behavior through positive attitudes. The framework of our study integrates both theories underpinning this study. Citizen participation in climate action is influenced by the citizens who have a positive perception of climate issues. Actual citizen participation is influenced by encouraging positive attitudes among the citizens. This study's framework, which is influenced by the TPB theory, posits that positive attitudes on societal norms that are climate-friendly eventually lead to societies that are actively involved in climate action. However, this outcome is a gradual transformation that passes through various stages of the citizen's acknowledgment and eventual knowledge on climate change as posed by the Transtheoretical theory. The integration of both models would be effective in providing a clear guideline for participation in climate action and policies. See Figure 1, below:

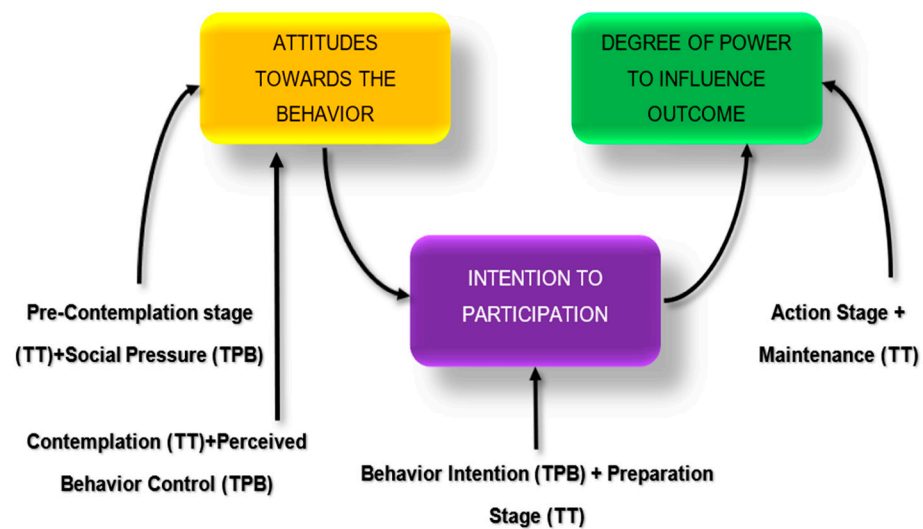


Figure 1. The theoretical framework that guided this study, which assesses citizen participation influenced by planned behavior through positive attitudes.

2.2. Survey Administration

2.2.1. Pilot Study

The study employed a quantitative research methodology. The data for our study were collected with the help of an electronic survey. An online survey was developed, and a pilot tested to gather feedback on perceptions and attitudes toward citizen participation in mitigation and adaptation efforts for climate action within the Malaysian urban context. A pilot study with 30 respondents supports an ideal sampling size for a pilot test [38]. The participants for the pilot test for this study were local and international youths currently studying at local higher education institutions, experts from organizations in the climate change sector, academics, and Non-Governmental Organizations (NGOs). The pilot study was conducted to correct any potential barriers to actual data collection. The pilot study focused on analyzing the reliability of the survey instrument. There were 58 items in the questionnaire with statements that were worded to indicate the respondents' attitudes toward issues of climate change using a 5-point Likert scale, with "strongly agree" to indicate a positive attitude and "strongly disagree" indicating a negative attitude. According to [39], ascertaining reliability and validity is an important feature of any quantitative research study. Reliability will indicate the consistency of a measured concept, while validity will be seen as an indicator that confirms a concept. The present study used the Cronbach's alpha internal reliability test with the data obtained from the survey using the SPSS version 23 software.

Our questionnaire items were created using the foundations of our theoretical orientation. The items in Section B of our questionnaire were items used to measure the attitudes toward climate change. The TPB model's social norms shaped the items of our questionnaire to address social norms on climate change in urban areas. Section C items were items used to measure attitudes toward citizen participation. Section C items were influenced by our second theory, the TT theory. The items were worded with statements that reflected the different stages of the cyclical theory, from pre-contemplation of climate change to maintenance, which is the actual participation in climate-related initiatives. Section D comprised items worded to indicate the perceived behavior control in the actual participation in climate initiatives that influenced the TPB theory. Section E items were derived from the ladder of citizen participation by Arnstein, indicating the level of citizen participation that can be given to citizens in climate issues [40]. Our survey items were developed through an extensive review of various literature and research studies focusing on citizen participation within climate change areas. Some of our questionnaire items were also adopted from previous studies conducted online in similar research areas [41].

The final version of the survey contained five sections, namely Section A: Demographic information, Section B: Attitudes toward climate change, mitigation, and adaptation with 13 items, Section C: Attitudes toward Citizen Participation were measured using 17 items, Section D: Attitudes toward Citizen Participation in Climate Change Policy Formulation were measured with 28 items, and lastly Section E: Attitudes toward the degree of Citizen Participation were measured with 8 items.

We also conducted an expert validation exercise to determine if the items developed were suitable [42]. The online survey items were reviewed and validated by three external experts, namely two academics and one climate change expert from an international environmental Non-Governmental Organization (NGO). The examination of the instrument was conducted by paying close attention to the relationship between the different variables. The first academic expert reviewer responded with a recommendation to align to climate mitigation practices and their relation to the concept of citizen participation. This was addressed in Section B of the questionnaire, where the items sought to identify the respondents' attitudes on climate mitigation to measure their participation level. The first academic expert reviewer also advised clarifying the levels of citizen participation expected by the respondents, which were also addressed accordingly in Section E of the survey. The second academic expert reviewer responded with similar remarks but emphasized the relationship between climate adaptation and citizen participation. This helped to shape the adoption of our items in Section B of the survey as well. The third expert reviewer from the international NGO responded with suggestions to add to the daily sustainability practices that citizens are currently engaged in, including clear definitions for the layperson to understand the concept of climate change and the aims of the research. The result of our expert validation was the rewording of unclear statements and the addition of 8 items to address the advice from expert reviewer 1. Upon addressing the experts' feedback regarding the validation process, and to ensure the validity of the data, a pilot study was conducted.

Our pilot study was conducted with a total of 66 items from the original 58 items before validation. We collected a total of 40 responses for the pilot study, of which only 33 responses were included for the reliability test. Six responses were excluded, as they were duplicates of their original responses. One response where the 'No' option was selected was also excluded. The pilot study's participants indicated that some of the jargon used in our survey was not easy to understand. Hence, we corrected this by providing definitions of these words as notations within the survey. This simple action also helped with the clarity of the language we used in the survey. The findings from our pilot study revealed that the survey instrument was adequate. Both the validation with experts in the area and the pilot test ensured the validity and reliability of the data collection instrument. The finalized survey items were then transferred to a Google Form.

Assessing the reliability of our data helped us as researchers to determine the ability of the chosen instruments to measure consistently [38]. According to Tavakol and Dennick [43], a Cronbach alpha value falling between 0.7 and 0.95 is considered good. The results for the Cronbach alpha analysis conducted for this study indicated that the results were all within a good range. Attitudes toward climate change, mitigation, and adaptation were measured using 13 items, with a result of 0.745. Attitudes toward Citizen Participation were measured using 17 items, with a result of 0.883. Attitudes toward Citizen Participation in Climate Change Policy Formulation were measured with 28 items, with a result of 0.921. Lastly, attitudes toward the degree of Citizen Participation were measured with 8 items, with a result of 0.843. Table 1 illustrates the results of the alpha analysis.

Table 1. Cronbach Alpha results for the Pilot Study.

Measure	No. of Items	Cronbach α
Attitudes toward climate change, mitigation, and adaptation	13	0.745
Attitudes toward Citizen Participation	17	0.883
Attitudes toward Citizen Participation in Climate Change Policy Formulation	28	0.921
Attitudes toward the degree of Citizen Participation	8	0.843

2.2.2. Main Data Collection

The actual data collection stage followed the pilot study. Using a purposive sampling approach, combined with techniques such as snowballing and chain referrals, the link to the online survey instrument was then distributed to the respondents. The study was conducted with $n = 384$ indicated as the sample size for our study [44]. The sample consisted of a wide array of urban community respondents [45]. Our data collection was carried out from July 2021 to November 2021. In order to comply with the research ethics protocols, the respondents of our study were informed that their participation in the study was voluntary. Participants were required to indicate their agreement to participate in the study, having read the purpose of the study and the conditions to participate. We also informed our respondents that the answers they provided would be treated with the strictest confidence, with the protection of their personal data always upheld. Participants for the main study were youths, members of the public, experts from organizations in the climate change sector, academicians, and NGOs [46].

This study utilized electronic means to distribute the survey. According to Israel [47], an electronic questionnaire is an acceptable means to collect data from respondents. In addition, due to movement restrictions enforced because of the COVID-19 pandemic, we were unable to distribute a physical survey. A link to the electronic survey was distributed to respondents via email and social media platforms. A total of $n = 423$ respondents answered the survey. The total number of collected responses exceeded our targeted sample size of $n = 384$. This, however, is an advantage to our data analysis because as the sample sizes increase, the variability of each sampling distribution decreases, so they become increasingly leptokurtic. A leptokurtic distribution in our study indicated broader fluctuations, resulting in greater potential for extremely low or high results [48].

Results for the Cronbach alpha analysis were also within the acceptable range for the actual data collection stage. Attitudes toward climate change, mitigation, and adaptation were measured using 13 items, with a result of 0.752. Attitudes toward Citizen Participation were measured using 17 items, with a result of 0.877. Attitudes toward Citizen Participation in Climate Change Policy Formulation were measured with 28 items, with a result of 0.923. Lastly, Attitudes toward the degree of Citizen Participation were measured with 8 items, with a result of 0.830 Cronbach's alpha. According to Tavakol and Dennick [42], a Cronbach alpha value falling between 0.7 and 0.95 is considered good. The alpha results from the study indicate that the instrument was well developed.

3. Results

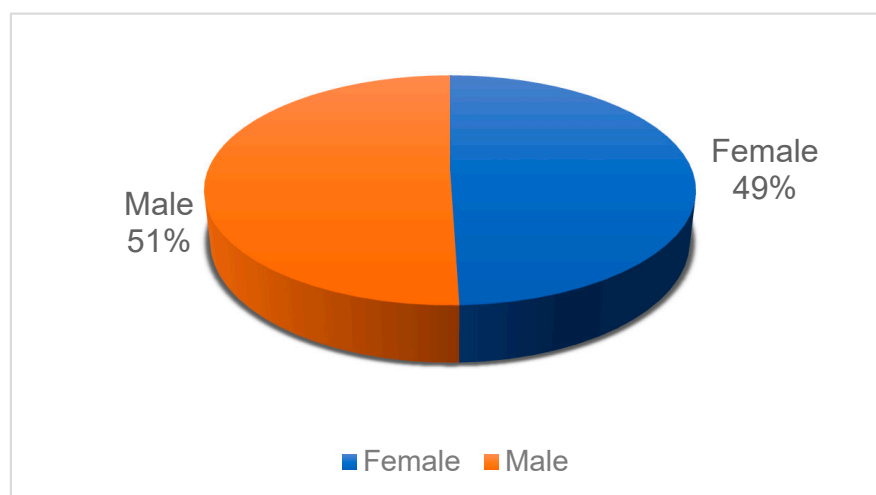
3.1. Socio-Demographic Characteristics

The respondents of our study were those living in urban communities in Malaysia. Malaysia is made up of a total of 13 states, and our study was not limited to any chosen state. We managed to cover a wide spectrum of the different states. The highest record of the respondent was from the Perak state, which covered 32.4%. This was followed by Selangor, which recorded 21.5%, while WP Kuala Lumpur and Sarawak were tied, with 6.6% of our respondents. The lowest record of respondents was for Perlis, Putrajaya, and Melaka, which all recorded respondents below 1.4%. Table 2 below highlights the demographic profiles.

Table 2. State or Territory of Respondent.

State	Frequency	Percent
Johor Bahru	15	3.5
Kedah	14	3.3
Kelantan	12	2.8
Melaka	6	1.4
Negeri Sembilan	24	5.7
Pahang	8	1.9
Penang	22	5.2
Perak	137	32.4
Perlis	1	0.2
Sabah	19	4.5
Sarawak	28	6.6
Selangor	91	21.5
Terengganu	16	3.8
WP Kuala Lumpur	28	6.6
Putrajaya	2	0.5
Total	423	100

The survey results, as demonstrated in Figure 2, below, recorded results from the female respondents, with 49%, and the male respondents, with 51%. This is an almost equal balance of responses gender-wise. Figure 2 illustrates the gender of respondents.

**Figure 2.** Respondents Gender.

As seen in Figure 3, the oldest age group recorded was above 65 years. The respondents of our survey were of the appropriate age groups, which means they were able to read the survey questions, understand them, and provide a response. Though we recorded more male responses, this did not affect the outcome of our results, and neither did it create any sense of bias. Our responses cover age groups ranging from 18 to above 65 years of age. The respondents of the age group below 21 make up 63% of our total responses. This is followed by the age group 21–30 years, making up 23% of the total responses. The age group 31–40 recorded 8% and, lastly, the age group 41–55 recorded 6% of the total respondents. The respondents of the age group of above 65 years represented 1% of the total respondents.

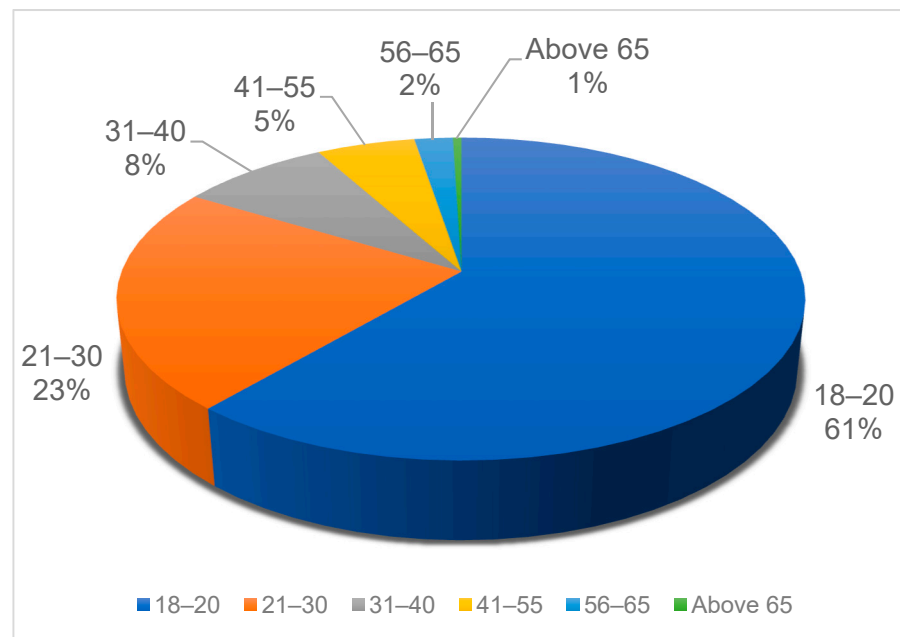


Figure 3. Respondents' age groups.

3.2. Stakeholder Attitudes toward Climate Change Mitigation and Adaptation

The results in this section will be discussed in tandem with four items from our questionnaire responses. The four items were selected due to their ability to illustrate stakeholder levels of awareness on climate change mitigation and adaptation efforts at the community level. The items included, as shown in Figure 4, are responses to the following statements: “I have in-depth knowledge on climate change and how to respond to it and I have participated in citizen participation efforts organized in my city”. Responses to both statements were analyzed individually and later cross-referenced to assist in rationalizing our data. Most of our respondents indicated that they were not sure whether they had in-depth knowledge of climate change and how to respond to it. This shows a crucial knowledge gap that needs to be addressed for effective policy enforcement. Malaysia has since introduced national climate and local policies that were engineered to help combat climate-change-related disasters. Citizen receptivity to these policies and their level of preparedness has, however, been a major barrier to steps taken toward creating climate-resilient communities. Malaysian citizens seem to be passive in their willingness to learn about climate education and its effects [49]. For a community to successfully build a resilient society, it requires the majority of its members to be “hands-on” i.e., taking center stage in spearheading initiatives and solutions to combat climate disasters. This is because the community is mostly the first responder to disaster occurrences. The results of our study thus suggest the need to increase efforts to boost knowledge on climate-related initiatives, given that many of the respondents indicated that they were “not sure” about climate matters.

The results also suggest that the attendance of locally organized events at the community level is also very low, with most respondents indicating that they are either “not sure” or have never attended any climate-related events organized in their cities. These results could be attributed to the methods used by the local authorities to publicize the programs. Moving forward, the effective publicizing of the events could encourage citizen participation [50]. Citizens with adequate understanding and knowledge on climate issues being addressed by the programs organized would also most likely develop positive attitudes toward attending and participating in the events [50].

The next two items were statements that addressed the awareness levels on the current policies in Malaysia on climate change, as shown in Figure 5. These include responses to

the statements “Climate change is real” and “There are climate change mitigation and adaptation policies enforced in my city”.

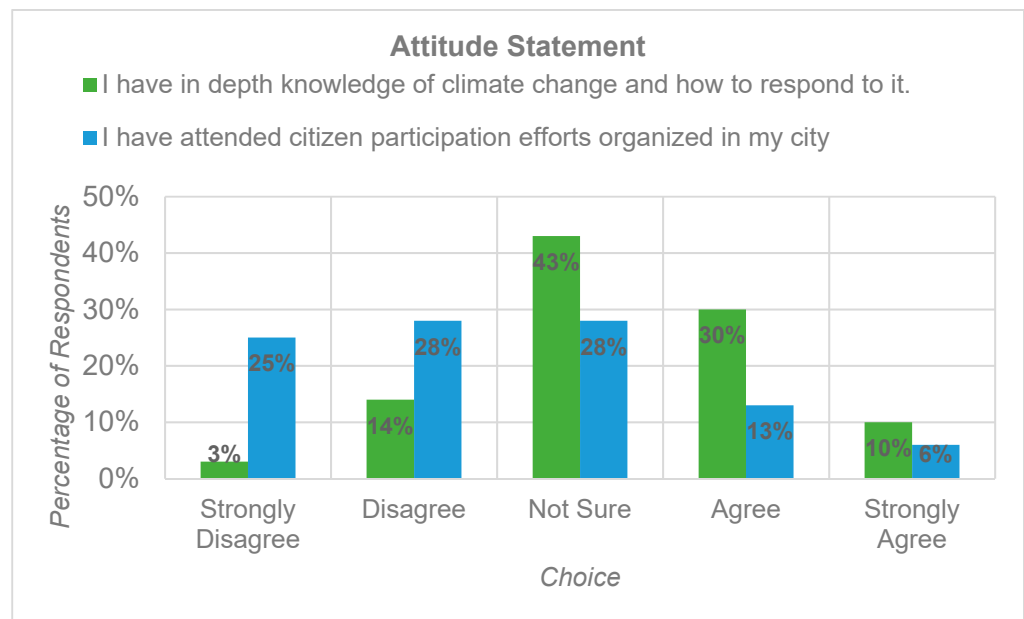


Figure 4. Citizens’ knowledge on climate change and climate change programs.

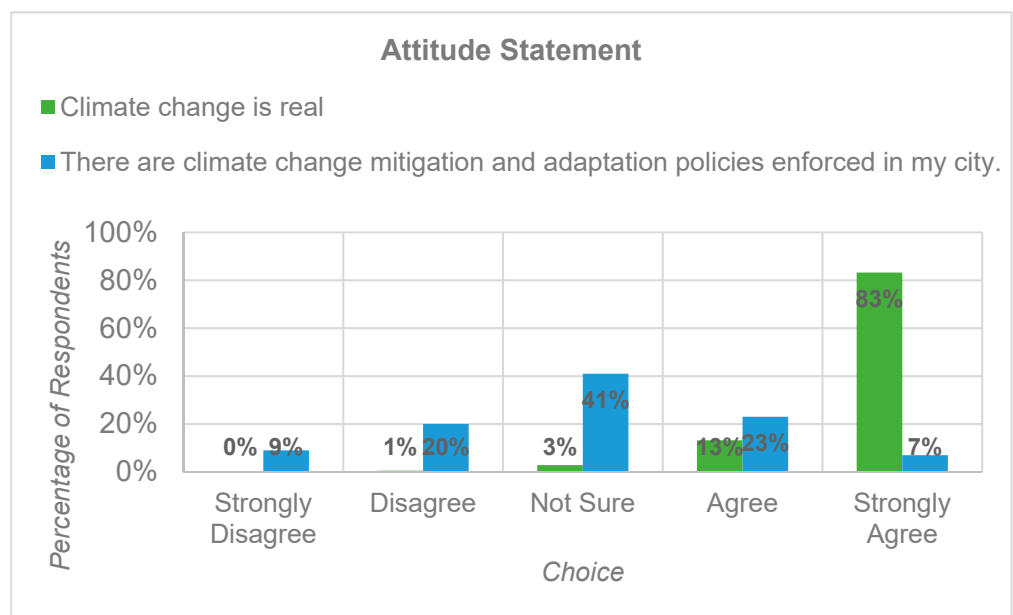


Figure 5. Citizens’ knowledge on climate change and policies.

The responses from both statements were analyzed individually and later cross-referenced to assist in rationalizing our data. The results of our study suggest that most of the respondents were not fully aware of the current policies available in their cities, especially those relating to climate issues. This speaks to possible policy enforcement shortcomings, as these policies are put in place to help the communities transition to their desired climate resilience levels. Despite the lack of awareness of current climate policies that are in place to enhance community resilience and limited climate knowledge, most respondents acknowledged that climate change is real and that it is a current threat to their communities. A limited environmental awareness about crucial environmental

problems and rising global temperature issues hinder the possible achievements of policy-makers in efforts to tackle and advocate environmental concerns. Policy-makers are thus recommended to pay closer attention to raising environmental awareness levels and factor these as strategies to tackle during the policy development and implementation stages.

3.3. Stakeholder Attitudes toward Citizen Participation in Climate Change Policy Formulation

The results in this section will be discussed in tandem with six items from our survey. The six items were selected due to their ability to illustrate stakeholder perspectives toward citizen participation in the policy-making process. The first items to be included, as shown in Figure 6, are responses to the following statements: “Citizens should play a primary role in the climate policy development process and Citizen participation is encouraged in my city”. Responses to both statements were also analyzed individually and later cross-referenced to assist in rationalizing our data. Figure 6 indicates that most respondents think that participating in environmental programs at the community level is not common, though citizens should be included in climate-related policy development processes. The fact that most respondents are not sure whether citizen participation is encouraged in their city could indicate why most Malaysians are still not sure of what their role is in climate change mitigation and adaptation efforts. This also confirms our study results that many Malaysians do not participate in environmental programs. However, our results also indicate that most respondents think that citizens ought to play a primary role in climate policy development processes.

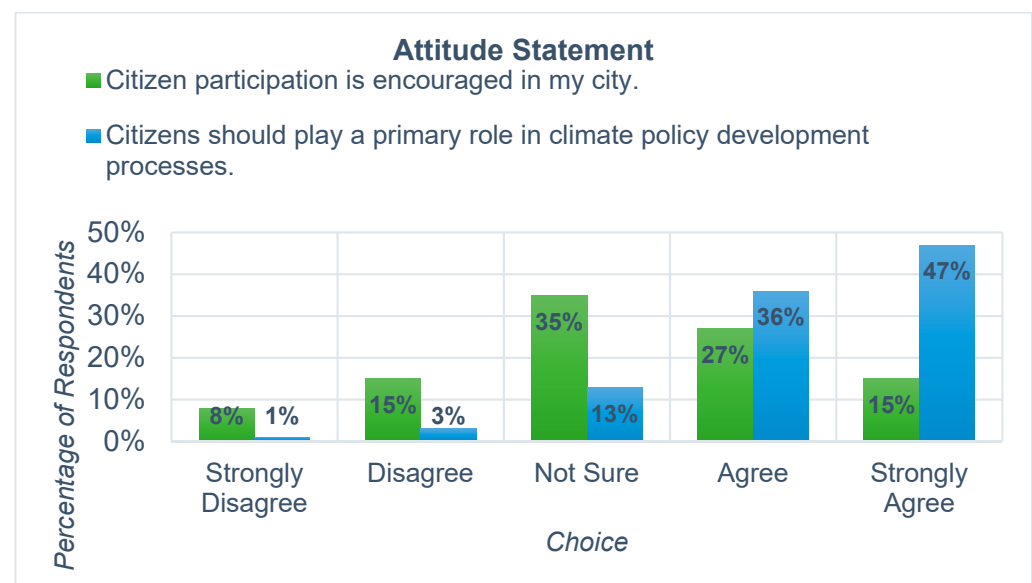


Figure 6. Attitudes toward climate policy-making processes.

The Local Agenda 21 has been incorporated by the different local councils in Malaysia. The Local Agenda 21 (LA21) is a program that was designed to create partnerships between local authorities, such as the local City Hall, City Councils, the Municipal Council, and District Councils together with the local communities, which thereby work together in planning and taking care of their surroundings for achieving sustainable development in their area. This took place in June 1992, when 178 Heads of State, including that of Malaysia, attended the World Summit of Nations in Rio De Janeiro, Brazil, to provide a world action plan for sustainable development, which was termed (LA 21). Since then, the local municipalities of Malaysia have been implementing the agenda in their development plans, with varying success stories. A lot of programs have been put in place to help educate the citizens on the agenda, but what remains is the question of whether the citizens have taken an interest to participate in such initiatives [20].

A top-down approach to climate-related issues has been the main approach to the current initiatives put in place for combating climate change in Malaysia. The Malaysian government has been at the frontier of the climate change dialogue, with acknowledgment given to the role of the citizens in helping to create climate-resilient communities. The government has set up many agencies and bodies that work to help Malaysia in meeting its emission goals for the Paris agreement. The Ministry of Environment and Water of Malaysia (KASA) has also played a role in the promotion of research related to helping combat climate change [51]. However, there have been more calls for a bottom-up approach, where the citizens take center stage in helping combat climate change in their communities [52]. This means that citizen participation in climate-related issues should take on a more center stage role for sustainable climate action measures to be accelerated at the local level.

The next two items were statements that addressed negative attitudes toward participating in policy-making procedures. These included the responses illustrated in Figure 7, namely, “There is no need for me to participate in climate policy formulation within my community” and “Climate-related policy processes are too complicated for me”.

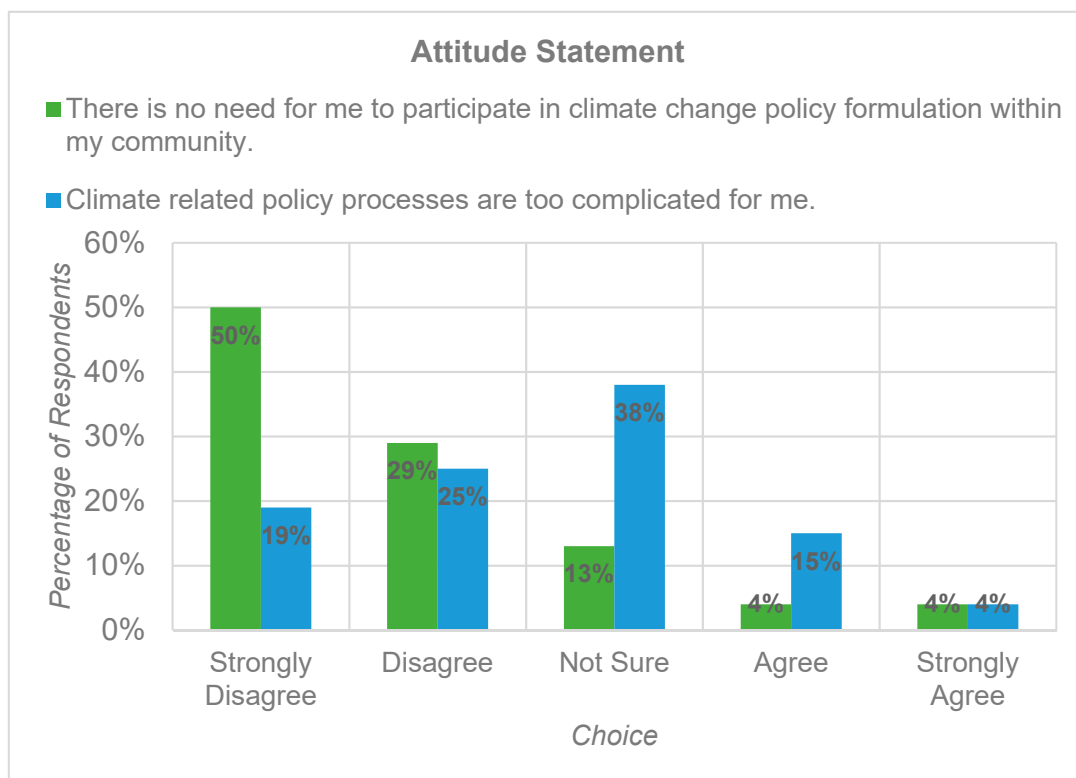


Figure 7. Citizens’ attitudes toward participating in climate policy-making processes.

Responses to both statements were then analyzed individually and later cross-referenced to assist in rationalizing our data. The results from our survey suggest that more than 50% of the respondents strongly disagreed that they should not participate in climate policy formulation processes within their community. This indicates a sense of awareness of the importance of climate policies. Our results also revealed that almost 40% of Malaysians are not sure if policy formulation processes are too complicated for them. This could possibly be explained by the fact that current Malaysian policy processes are more expert-opinion-centric, with a limited inclusion of the citizens, for whom the policy is developed. The cross-reference of both results suggests that if Malaysians are given enough education on the policies in place and are included in the policy development processes from the inception to implementation stages, they could contribute more effectively toward realizing the aims of these policies. This was also established in a study conducted by Salleh et al. [53], who indicated that for more effective results on sustainable efforts at the community level,

the establishment of comprehensive and inclusive policies will lead to effective mitigation and adaptation processes in Malaysia. Most of our respondents indicated the need to be involved in the policy-making process, as a way of getting better knowledge and awareness of policies that are in place to help combat climate change. This could also help in preventing the formulation of redundant policies that do not yield results [49]. The designing of policy is crucial to the effect that it can cause the environmental protection programs to not reach their objectives if the public's environmental awareness is not taken into consideration.

The final two items were statements that addressed the influences of policies on citizens' climate mitigation and adaptation efforts. These included the responses "Current policies on climate change influence my decision in contributing to my community's resilient practices" and "Participating in climate policy-making will raise my interest in climate issues", as shown in Figure 8. Responses to both statements were further analyzed individually and later cross-referenced to assist in rationalizing our data.

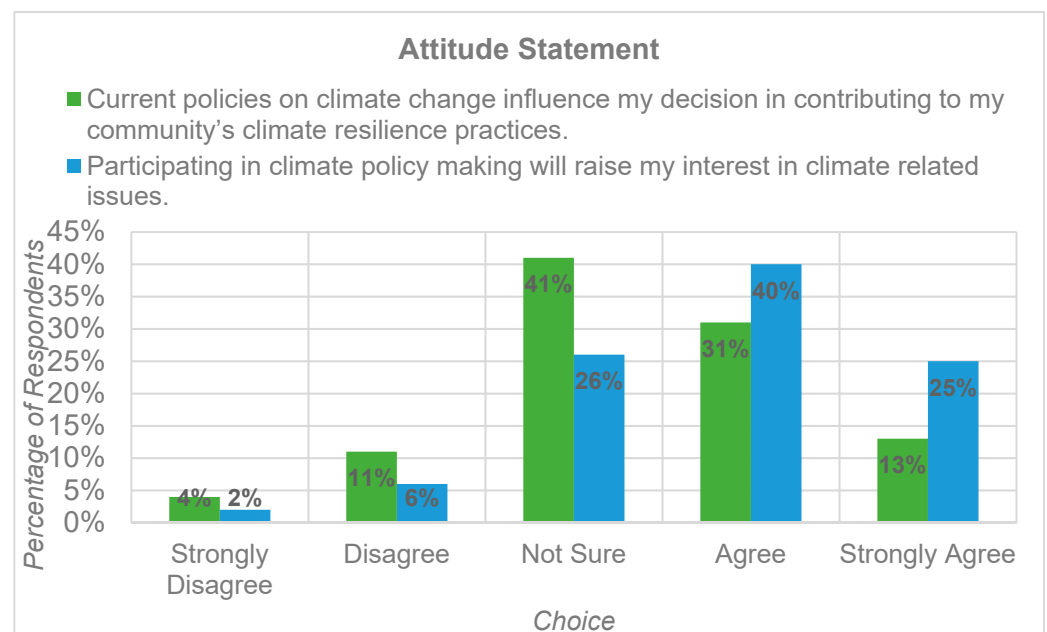


Figure 8. Citizens' attitudes toward citizen participation in climate policy.

More than 40% of our respondents said they were "not sure" if the current policies influenced them in climate mitigation and adaptation behaviors. This can be attributed to the fact that the earlier results discussed in this paper had also highlighted a lack of knowledge regarding current policies for mitigation and adaptation. About 45% of our respondents also agreed that participation in policy-making would cultivate positive attitudes in climate issues. These results indicate that for policies to be effective, they must be formulated in a manner that is easily translated to the local citizens. As demonstrated by the TPB, this study focuses mostly on the attitudes of the citizens and the anticipated control of power given to the citizens in climate dialogues and policy-making procedures. Clear policies will result in positive attitudes and lead to effective policy implementation for mitigation and adaptation. Hence, as seen in the results of our study, policies on climate change do play a role in developing sustainable practices in citizens if they are clearly and effectively communicated upon implementation, as advocated by Ajzen [54].

3.4. Stakeholder Attitudes toward the Degree of Citizen Participation

Climate-resilient communities are made up of actively participating citizens who are at the forefront of raising awareness and education on the dangers of climate change to their local citizens [35]. As reported by our results, respondents have little knowledge of

their role in climate change awareness. The results in Figure 9 represents the respondents' views on the degree of control citizens can have regarding being included in climate change dialogues and policy-making procedures. This was directed from Arnstein's theory of citizen participation, which features an eight-step ladder of participation that illustrates the power that can be allocated to local citizens who have no authoritative power otherwise. The results of our study suggest that most respondents would like to have a delegated participation in climate-related issues. In delegation, the citizens will hold a clear majority of seats on committees with delegated powers to make decisions related to climate change and adaptation. The public will then have the power to hold them accountable. This will build trust and a sense of perceived behavior control in line with the Theory of Planned Behavior [32]. Our results also recorded high responses in citizens being awarded negotiation powers in climate dialogues. The results also showed a preference for planning and decision-making responsibilities to be shared through joint committees.

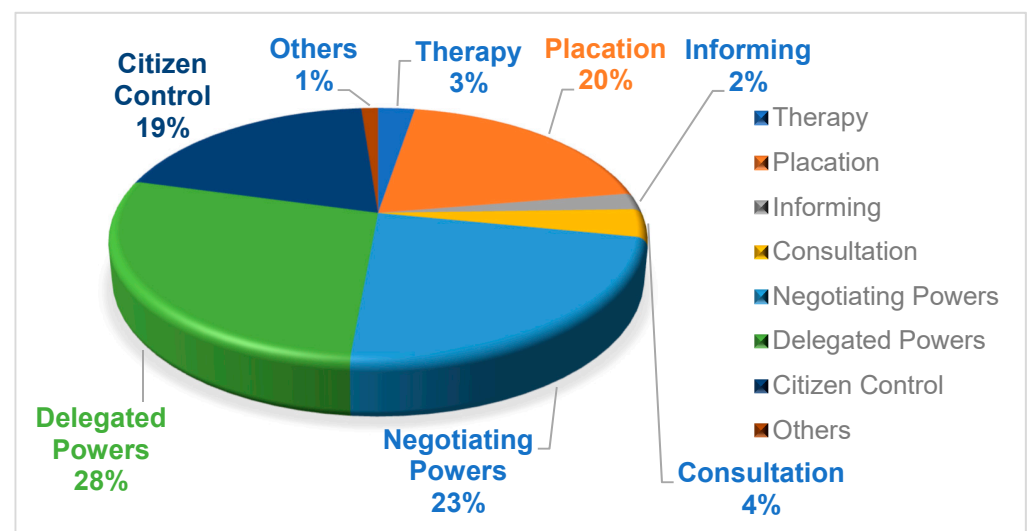


Figure 9. Citizens' attitudes on the required level of local citizen power in climate dialogue.

4. Climate Change Mitigation and Adaptation in Urban Malaysia—Implications for Climate Policy Effectiveness

The results from our study measuring respondents' in-depth knowledge on climate change and how to respond to it indicate that most of them believed they were "not sure" about climate change issues. In tandem with the theoretical orientation of this study, awareness is crucial in creating positive attitudes toward actual behavior. This means that with this level of awareness, there is a limited capacity for active involvement in climate change mitigation and adaptation efforts. This translates into the first stage of the Transtheoretical theory, which is rather low. In the Transtheoretical model of behavior change, a state where an individual has no awareness or intention of behavior change is the pre-contemplation stage, which is the first stage of societal behavioral change. Awareness is the prerequisite of behavior change which brings out the actual behavior change [55]. Citizens will not be able to exhibit positive attitudes toward climate-change-related issues when their awareness level is low. Climate change mitigation and adaptation are citizen-centered and thus require a high awareness of the subject matter within the community for a successful implementation. Aminrad et al. [56] also found that where the awareness of climate change is high, citizens are more willing to participate. This is similarly suggested by the results of our study that showed that most of the respondents do not attend initiatives on climate change that are organized by their local authority due to a lack of awareness of both the subject matter and the programs organized. Lack of awareness has also led to passive attitudes in retaining mitigation and adaptation information and efforts. This will result in poorly executed local programs and possibly a waste in the resources channeled toward mitigation and adaptation efforts.

When asked whether citizen participation is encouraged in their city, the respondents responded with the highest record of not being sure. This may be attributed to the fact that most citizens have been reported to have inadequate knowledge of climate issues. The citizens' participation in climate policy formulation processes is low. The Transtheoretical theory underpinning this study defines awareness as one of the early stages before an individual can participate in its second stage, which is the contemplation stage [57]. As a result, the inclusion of citizens in the policy-making process will be ineffective, as they would not be able to provide useful contributions without knowledge of the policy subject matter. This also explains why most of the respondents found climate policies too complicated for them but still showed a high interest in being involved in policy formulation procedures. Our results show that more efforts should be channeled toward more climate knowledge and education for the Malaysian urban community, to enable effective climate mitigation and adaptation measures [49].

There is currently little to no knowledge on climate-related mitigation and adaptation initiatives among the urban community respondents that took part in the study. Despite Malaysia facing climate-related disasters in the past, there is an indication that among the respondents, there are some who are yet to master enough knowledge on climate-related issues. Though our results indicated the respondents' acknowledgment that climate change is real, they remain passive about learning more on the subject. This explains why there is little participation in climate-related initiatives at the community level, which eventually leads to less resilient communities. The Malaysian government, through the LA21, has introduced a raft of policies to help combat climate change [58]. However, as indicated in the results of our study, the respondents have little knowledge of these existing policies. This could indicate possible policy misinformation. For policies to be effective, the public needs to be aware of the policies and their implementation in their communities. Hence, the inclusion of the public in policy formulation procedures can be a possible recommendation to minimize or possibly eliminate passive attitudes from the public. However, knowledge of the subject matter is still a prerequisite for involving the public in these processes.

As posited by the TPB, perceived control on matters that affect the communities could help create positive attitudes among the public. That is, for the public to be more involved in climate-related issues and policy-making in their communities, they must be motivated to participate. Motivation to participate can be achieved, according to the TPB, by having positive attitudes and the idea that the citizen has control over the process at hand. With our results indicating an interest to be involved in policy-making, this study anticipates a creation of subjective norms whereby a culture of lifestyles that support positive climate adaptation and mitigating communities is encouraged. This theory posits a chain reaction of events stemming from positive attitudes in creating climate-resilient communities. According to a study conducted by Marans [59], policy-makers are concerned with creating policies that enhance the quality of life of the citizens. However, this will only be achievable if the citizens are actively involved in the policies and not just perceived as a silent recipient of what policy-makers propose. According to another recent study, conducted by Kaffashi and Shamsudin [60], subjective norms are the most influential factors on individual intentions. Other factors that influence an individual's behavior intention are their moral obligation, attitude, and environmental concerns.

Arnstein's Ladder of Citizen Participation shows and describes how empowered public institutions and officials tend to deny power to local citizens. Also shown is how levels of citizen agency, citizen control, and power can be increased [40]. As our respondents have indicated the need to have partnerships with the local authorities in climate-related dialogues, power will be distributed between the citizens and power holders through negotiation. This could set an ideal ground for citizens to view their opinions during policy-making processes. Citizens would also have shared decision-making responsibilities.

Citizens' inclusion and their level and degree of power during policy-making processes are a major aspect in creating effective policies and thereby building climate-resilient communities. Communities need to have an opinion of what happens in their everyday

lives, especially when it comes to dealing with possible life-threatening climate disasters. As the residents are the first respondents to the disasters, it is only sensible that they are included in the dialogues that discuss solutions to any future disasters [49]. This will help create effective solutions other than only including the residents in the implementation stages of these solutions. Respondents have recorded an interest in the increase of the level of power they are given in the climate change dialogues, according to the results of our study. This is also confirmed by Kaffashi and Shamsudin [60], where it was found that it is necessary to introduce programs that promote a sense of perceived behavior control in society. This is also posited by the TPB theory as one of the factors that can influence actual behavior changes in citizens. Having control over decisions that can possibly influence citizens' everyday lives will create positive attitudes toward an active involvement in climate change mitigation and adaptation efforts. Thus, as this study reports, if citizens are given control over policy making processes, this will cultivate positive attitudes toward the actual successful implementation of the policies designed for climate change mitigation and adaptation.

In the year 2021, Malaysia has made great strides in actions toward climate change. The Ministry of Environment and Water (KASA) launched, on the 3rd of August 2021, the Third Biennial Update Report (BUR3) to the United Nations Framework Convention on Climate Change (UNFCCC). The BUR3 showcases the predicted human-caused carbon emissions and reductions in sectors like energy, industrial processes, and products used (IPPU). Also showcased were agriculture, forest use, and other land use (AFOLU) and waste sectors. The estimated period has been stated as 1990 to 2016. Also reported were the mitigation actions with their effects in the year 2016. The submission of the BUR3 report in 2020 was aimed at meeting Malaysia's obligatory emission reduction goals as a Party to the UNFCCC. An important aspect of the launch of the BUR3 report for our study is the renaming of the Malaysia Climate Change Action Council in December 2020. Having the public sit in such councils would help to increase the level of power the citizens will have in climate change dialogues and cultivate a positive attitude toward mitigation and adaptation efforts locally.

Overall, our study explored the attitudes of Malaysian citizens toward citizen participation as a tool for measuring climate policy effectiveness. Local initiatives on climate change by Community-Based Organizations (CBOs) are mostly affected by current policies. Most programs organized by CBOs have been mostly ineffective, given the restrictions that are imposed by policies governing mitigation and adaptation efforts locally. The translation of policies at local levels has been unclear due to the inadequate representation of the communities in policy-making procedures at state levels. There is a need for policy reform that will enable clear guidelines to include more citizens in policy-making and enable a clear translation of policies at the local levels.

This study highlights the need for a more strategic bottom-up inclusion in all stages of policy-making that discuss climate change mitigation and adaptation efforts. Another implication of our study is the need to empower citizens during climate policy-making procedures. Citizens with a voice on their communities' wellbeing tend to be more participative in the mitigation and adaptation efforts proposed. As indicated in the study reported by Khadzali and Md Zan [61], the Malaysian government has invested in various participation platforms. However, these platforms do not provide the citizens with enough power to voice their opinions by setting participating rules and restrictions. This has resulted in policy redundancy, as most policies fail in translation at the local level. The results of our study suggest that citizens ought to be given more say in policy-making procedures that affect their communities.

5. Conclusions

This paper explored citizen participation attitudes and their influence on climate change mitigation and adaptation policies. We found that attitudes are indicative of behavior change in mitigation and adaptation policies. The study sample generally exhibited

passive attitudes toward climate issues and policies, which explains the low level of awareness and knowledge in climate issues. The study results also suggest that there is still a lot of room for progress in climate education in Malaysia and a need to expedite the actions taken for mitigation and adaptation, as climate change continues to progress at a fast rate. Many of our respondents are still not sure of what their role is in climate issues. This study, therefore, puts forward the following recommendations: (a) To avoid policy redundancies, citizens attitudes could be viewed as an indicator of successful new laws before implementing new climate policies within the urban development context, (b) Education and awareness on climate policy issues within an urban development context should be targeted for cultivating positive attitudes and changing the behavior of the citizen, (c) Local communities should be included at all stages of the policy formulation procedures to cultivate positive attitudes and a sense of ownership when implementing new laws, (d) Citizens should be given more power than tokenism in participating in climate dialogues and policy-making at the local level, to help them make educated and informed contributions to new laws. With the dialogue changing and calling for a more bottom-up approach to climate action, the contribution of the public must become the focus in creating climate-resilient communities. Our study results and recommendations suggest that future research should work on solutions focusing on empowering local citizens in policy-making procedures. Such solutions can help in effective policy implementation at the local level whilst educating the citizens to catch up with the growing demands of climate change caused by their anthropogenic actions.

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